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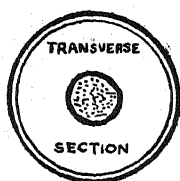
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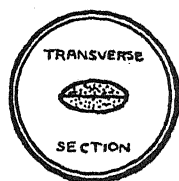
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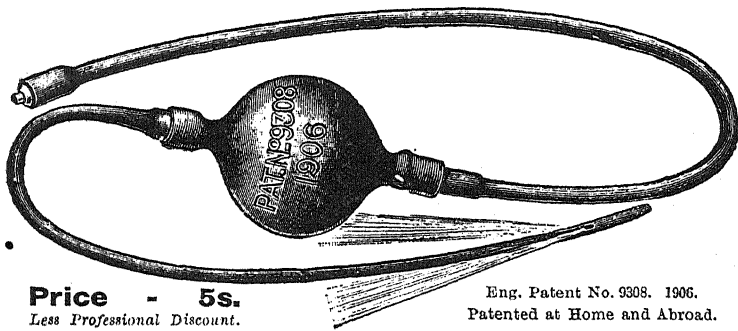
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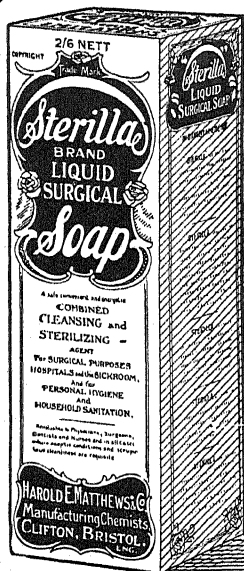
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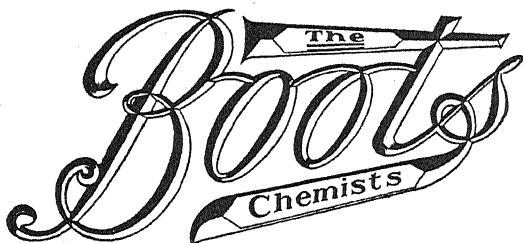
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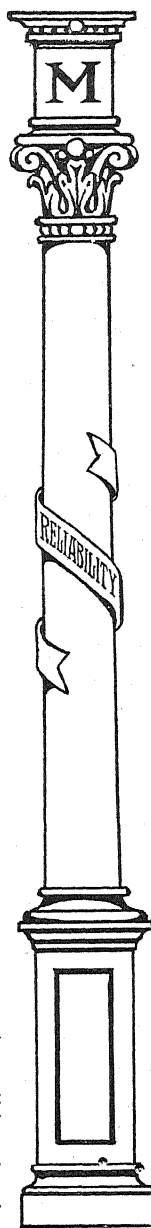
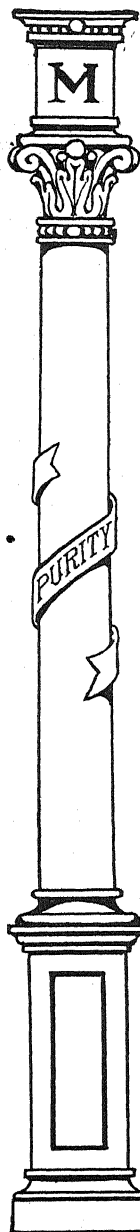
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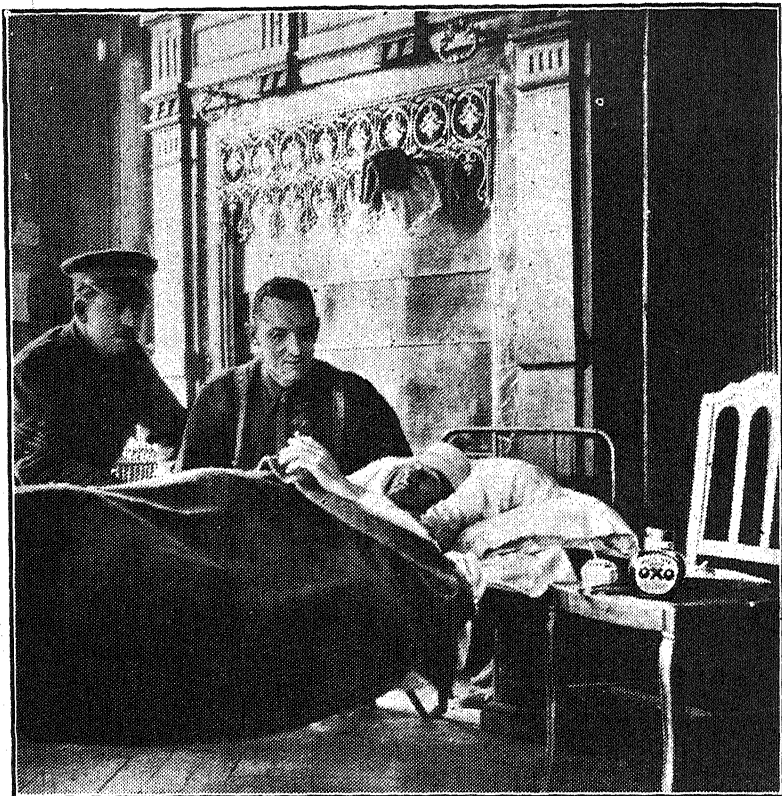
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A YEAR BOOK OF TREATMENT AND PRACTITIONER'S INDEX

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PREFACE

THE past year has not only been remarkable for the enormous number of injured men our profession have had to deal with, but also for the expert and detailed investigations which have been made on every point tending to the protection of the soldier from the adverse conditions to which he is exposed. In this, our thirty-fourth annual issue, we have endeavoured to bring together the results of this large experience and fruitful investigation in a form convenient for rapid reference.

We have given a special section to the general questions of Naval and Military Surgery, which will be found at the end of the Dictionary of New Treatment, and we think that our readers will find much to interest them in this section.

The special injuries to organs and nerves are considered under their proper headings in the body of the work. It will be seen that great changes of view have taken place, especially in regard to the surgical treatment of wounds. Naval and military surgeons being cut off from the ordinary sources of reference, it is important that they should be kept in touch, not only with the changes and new methods of technique, but with the investigations that have led to them. The *Annual* is the only publication which undertakes this special work, and we have tried to

keep before us the needs of members of our profession who have to undertake very serious responsibilities under novel conditions.

We have received much valuable help from the medical authorities, and we hope that every assistance will be given to us in supplying copies of the volume to our readers engaged on active service in all parts of the world.

While so much thought has been given to the results of the great War, other branches of medical study have been pursued with, perhaps, reflected energy. We have found a difficulty in condensing all the valuable information which has come to us, and we believe that this volume will prove one of the most interesting and instructive of the entire series.

Our readers will join in the deep regret we feel at the loss the profession has sustained by the death of Sir Charles Bent Ball, Bart., who for eight years regularly collaborated in the production of the *Annual*. He fully recognized its importance to the profession, and in common with all our contributors did not allow the great pressure of the present time to interfere with his obligations to this work.

THE EDITOR.

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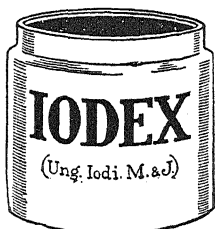
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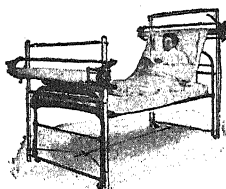
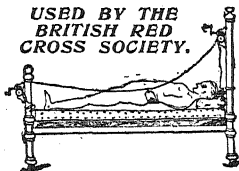
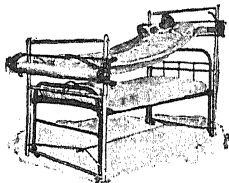
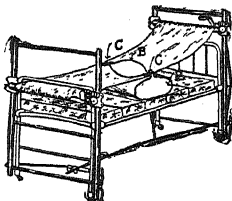
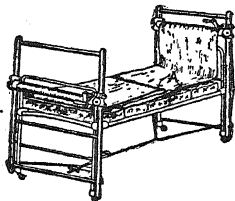
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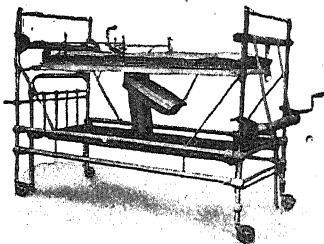
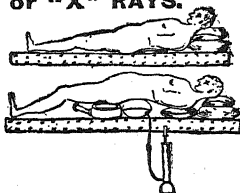
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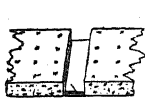
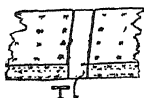
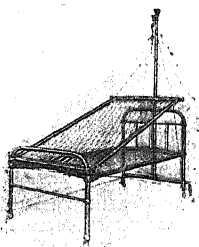
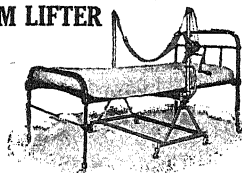
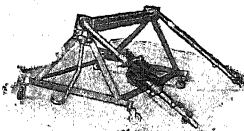
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GLOSSARY

Containing most of the newer terms in this and recent volumes.

Acapnia.—A state characterized by shortage of carbon dioxide in the blood. It is held by Yandell Henderson and others that this is a predominant factor in the production of shock.

Achlorhydria.—Absence of hydrochloric acid from the gastric secretions.

Activator.—A physical or chemical agent which renders active some other chemical agent. In medicine the term is applied almost exclusively to biochemical reactions.

Agglutinin.—A substance which has the power of agglutinating such cells as bacteria or red blood-corpuscles. This power is usually specific, i.e., for each kind of cell there is a specific agglutinin, a principle utilized in the Widal test for typhoid fever. In iso-agglutination the reaction is wider, the agglutinin proving more or less active with all bacteria belonging to a certain group.

Allergy.—The altered reactivity of an infected animal or person to a second infection with the same poison.

Amboceptor.—A substance which has the specific power of binding complement (q.v.) to the cell (or bacterium) for which it (the amboceptor) is specific.

Amino-acids.—An organic acid in which one of the hydrogen atoms of the base is replaced by NH_2 .

Anaphylaxis.—A specific susceptibility which may be manifested by an animal or person in response to a second injection of an organic substance the first injection of which was followed by no toxic results. The animal showing such acquisition of susceptibility is said to have become sensitized to that particular substance (see also Allergy).

Anisocytosis.—An inequality in size of the red blood-corpuscles.

Anoci-association.—This word embodies the prevention of surgical shock as it is conceived by Crile, who teaches that shock is the result of expenditure of nervous energy under the influence of abnormal stimuli. According to him, shock is to be prevented by guarding the brain from such stimuli, by 'blocking' of nerve trunks in the area of operation, by preventing all possible sources of mental perturbation, etc. This process of cutting out deleterious stimuli is 'anoci-association.'

Antiformin.—A solution containing several alkaline compounds which is used in the laboratory for the separa-

tion of tubercle bacilli from pathological products (sputum, urine, etc.) which contain it.

Antigen.—Extract of bacteria or of tissue used in that class of serum tests of which the Wassermann reaction is the chief, and which is based on the 'fixation of complement' process. The complement (q.v.) is 'fixed' by the union of the antibody or amboceptor (q.v.), to which it is attached, with the antigen, i.e., to the extract of bacteria or tissue for which that amboceptor is specific.

Autogenous.—As applied to bacterial vaccines, this adjective denotes those vaccines which are made from the patient's own micro-organisms, as opposed to 'stock' vaccines, which are made from standard cultures.

Azoturic.—Pertaining to the urinary excretion of nitrogen.

Bacteriolytic.—That which dissolves bacteria.

Carcinolytic.—That which is destructive to cancer cells.

Chromaffin.—A hybrid word used as an adjective in connection with cells or tissues which display an affinity for chrome salts. Thus the 'chromaffin system' is composed of tissues which possess cells having this property; its components are the adrenal and other ductless glands, and parts of the sympathetic system.

Coliform.—An adjective denoting those micro-organisms which resemble *B. coli communis*.

Complement.—A substance present in blood-serum, possibly of ferment nature, which, when linked by an amboceptor to a cell, constitutes with that amboceptor an agent capable of acting upon the cell. "The cell is the lock, the amboceptor the key, and the complement the hand that turns the key."

Cryoscopy.—Determination of the freezing point.

Diadokokinesis.—The performance of a rapid succession of alternating movements, e.g., pronation and supination.

Epinephrin.—One of the various names used to denote the active principle of the suprarenal gland.

Glycyl-Tryptophane.—A compound of glycine and tryptophane radicles, used for a test in examination of gastric contents.

Hæmodynamic.—Relating to the movements involved in the circulation of the blood.

Hæmolsin.—A substance possessing the power of dissolving red blood-corpuscles and liberating their hæmoglobin: if possessing this property in regard to the corpuscles of all animals of a certain group or species it is called an Isohæmolsin.

Heliotherapy.—Direct exposure to the action of the sun's rays for therapeutic purposes.

Herpetomonas.—A species of protozoon.

Heterogenous Vaccines are those prepared from organisms derived from some source other than the patient in whose treatment they are to be used; in such conditions the source is usually a 'stock' culture.

Hyperchlorhydria.—Excessive secretion of hydrochloric acid by the stomach.

Hyperplexis.—Abnormally high arterial tension.

Hypertonic.—As applied to saline solutions, the adjective denotes those which contain a higher percentage of salt than normal human blood-serum.

Hypodermoclysis.—Injection of quantities of fluid (e.g., normal saline) beneath the skin.

Karyosome (syn. Chromosome).—One of the small bodies into which the chromatin skein of the nucleus splits up in the earlier phases of karyokinesis.

Iontophoresis.—The introduction of ions into the body by the electric current, for therapeutic purposes.

Leucopoiesis.—The formation of leucocytes.

Lipoclastic.—Fat-splitting.

Lipoids are substances such as lecithin which enter into the formation of living cells, and which are like fats in their solubility in organic solvents such as alcohol and ether. These solvents can therefore be used for their extraction from the tissues.

Lipoproteins are combinations of protein with fatty acids.

Lymphopenia.—Deficiency of lymphocytes.

Meiostagmin Reaction.—A test used in the diagnosis of cancer, based on the estimation of interaction between antigen and antibody by measurement of the surface tension of a mixture of the two.

Metreurynter.—An instrument for artificial distention of the uterine cavity, e.g., a Champetier de Ribes' bag.

Microtia.—Congenital smallness of the ear.

Neurotropic.—That which 'turns towards' (i.e., has a chemical affinity for) nervous tissue.

Opothrapy.—The use of extracts of normal animal tissues as therapeutic agents.

Opsonic Index.—The ratio between the amount of 'opsonin' against a certain micro-organism contained in the blood of a person infected with that organism as compared with the content of similar 'opsonin' in a normal blood. 'Opsonins' are substances contained within the blood-serum which have the property of rendering micro-organisms fit for attack and ingestion by phagocytes.

Oxydases.—A group of ferments whose action is characterized by oxidation processes.

Phlebotomus Fever.—A three-day fever met with in the countries around the Mediterranean, also in India, conveyed by sand-flies.

Phosphatids are lipid substances which are esters of orthophosphoric acid.

Pleocytosis.—Increase of cells (lymphocytes) in the cerebrospinal fluid.

Pleomorphic.—Varying in form (applied to bacteria).

Poikilocytosis.—Variation in the shape of the red blood-corpuscles.

Polychromatophilia.—Variability in the staining affinities of the red blood-corpuscles.

Polynucleosis.—Polymorphonuclear leucocytosis.

Polypeptide.—Peptides are compounds formed by the union of two or more amino-acids; polypeptides are formed by the union of more than three such acids.

Polyvalent Sera are those which contain antibodies active against many strains of the same micro-organism.

Pyelography.—X-ray photography of the renal pelvis after injection through the ureter of some opaque substance such as collargol.

Sensitization.—(See Anaphylaxis, above).

Spirillicidal.—That destroys spirilla or spirochaetes.

Sporogeny.—Reproduction by spores, and especially sporulation after fertilization.

Thyrotoxicosis.—Poisoning by thyroid secretion.

Trophœdema.—Persistent œdema of the lower limbs; usually applied to Milroy's disease, a hereditary condition characterized by this type of œdema.

Trypanocidal.—That destroys trypanosomes.

THE MEDICAL ANNUAL

Part I.—The Dictionary of Materia Medica and Therapeutics.

REVIEW OF THERAPEUTIC PROGRESS, 1915.

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GENERAL REVIEW.

THIS section is shorter than usual. The war has cut off the supply of medical journals from Germany and Austria. Though the current journals of France are available, the demands made on the medical profession have apparently almost stopped research work. We find the same thing in England. Consequently we have been forced to depend chiefly on America for new material, and American papers bulk largely in the following section.

DICTIONARY OF REMEDIES.

ACONITE.

Thomson¹ holds that nitrites exert too evanescent an action to be of real service in reducing the blood-pressure in such a chronic condition as **Chronic Nephritis**. According to him, the most efficient vasodilator we possess is aconite administered in full doses. It reduces blood-pressure at once, produces a full and compressible pulse, and greatly increases the elimination of urea in chronic nephritis. It is essential to use full doses. Aconite is also useful in **Mental Derangements** of the nature of melancholia associated with heightened tension.

REFERENCE.—¹*Amer. Jour. Med. Sci.* 1915, 77.

• ADONIS VERNALIS.

Mercier¹ finds that the substance adonidine is not pure, and is really a mixture of two glucosidal bodies, adonidic acid and adonidin. The pure acid has a melting-point of 138° to 140°; It has a less marked stimulant action on the myocardium than adonidin, but has a similar action on the central nervous system. He took 2 cgrams of the pure

acid, and found that it caused marked salivation and gastro-intestinal irritation, culminating in vomiting and diarrhœa. The gastro-intestinal disturbance ceased in half an hour and was succeeded by a frequent desire to micturate. Neither adonidine nor adonidin has this gastro-intestinal action. An aqueous infusion of the leaves possesses diuretic and gastro-irritant properties, but the tincture is inert therapeutically and devoid of irritant properties, evidently owing to the fact that neither the acid nor the neutral principle adonidin is soluble in alcohol. He concludes that the active diuretic principle is the adonidic acid, and that its action is due to a direct stimulant effect upon the renal epithelium.

REFERENCE.—¹*Bull. Gén. de Thé.* 1915, 136.

ALCOHOL.

Lieb¹ has studied the reflex action of alcohol on the circulation. Using small doses of 5 to 10 c.c. of undiluted whisky, he finds that in a certain percentage of patients a reflex action is produced on the circulation. Probably this action is the explanation of the so-called stimulation which has been ascribed to alcohol as a direct action on the circulation. It is most marked in those with hyperactive superficial and deep reflexes, and is least evident in those who are apathetic as a result of bacterial toxæmia. In those accustomed to the use of alcohol the response is less. The reflex seems due to the direct irritant action of the drug, and when the whisky is well diluted (1-4 and over) there is practically no reflex action. As is the case with nearly all observers, who have accurately noted the action of alcohol on the circulation, Lieb is dubious about the stimulant effect. Even though whisky may raise the systolic blood-pressure for a few minutes, and thus act as an apparent circulatory stimulant, it cannot be regarded as a true stimulant, since it decreases cardiac efficiency, raises disproportionately the diastolic pressure, and lowers pulse-pressure.

REFERENCE.—¹*Jour. Amer. Med. Assoc.* 1915, i, 898.

AMMONIA, AROMATIC SPIRITS OF.

Parsons¹ makes some novel claims for sal volatile, which he considers a valuable adjunct in **Anæsthetization**. He takes advantage of the fact that inhalation of ammonia causes acceleration of the rate and increased depth of respiration, and probably an increased circulation. Now these effects are, he thinks, produced at all stages of anæsthesia by inhaling a few drops of sal volatile. Consequently he uses it in the early stages of anæsthesia when the patient is breathing very shallowly and thereby delaying narcosis. Similarly it is of use when there is obstinate cough or gagging, or when the patient becomes deeply cyanosed, with rigid fixed muscles and suspended breathing. In old people and children the administration throughout the operation of sal volatile is better than that of oxygen, as by stimulating the respiration it induces better aeration of the blood.

Finally, in the last stage of anæsthesia it is of value, as the employment of aromatics will bring the patient out of the anæsthetic quickly and diminish the risk of vomiting. In all cases the sal volatile is administered by inhalation, using the same care as in giving the anæsthetic.

REFERENCE.—¹*Ther. Gaz.* 1915, 232.

ANISOL.

Anisol is stated by Labbé¹ to be the best **Parasiticide** for lice. This methylated ether of phenol is found to act rapidly and energetically, immobilizing the lice and killing the nits. The corresponding higher homologues, methyl cresols, can also be used. Anisol acts both as a vapour and as a weak solution. One drop vaporized in 1500 c.c. air renders the lice immobile in six minutes and kills them in eighteen minutes, while a solution of 2.5 to 5 per cent in weak alcohol kills lice in thirty seconds, and sprayed on hairy parts is a certain destroyer of both lice and nits. To disinfect clothing he recommends spraying¹ and exposure on airy shelves for three hours.

REFERENCE.—¹*Bull. de l'Acad. de Méd.* 1915, No. 20, 615.

ANTISEPTICS. (See also DAHLIA, DISINFECTANTS.)

Using a method of pyoculture, Delbet¹ comes to the following unfavourable conclusions regarding antiseptics. Iodoform has no action on microbial flora of wounds. Washing and dressing with ether has no effect. Lactose powder is deodorant, but does not affect the germs. Watery solutions of oxygen are of no use in arresting the development of gas gangrene when used as injections, and irrigations have no action in reducing the number of anaerobic germs. Thus the antiseptics studied have not much action. They all damage the tissue-cells. He thinks that we should aim at utilizing the natural resisting powers of the tissues as much as possible. It is essential to use a fluid of equal molecular tension with the serum, and to be efficient the solution should be devoid of chemical action on the tissues. The polyvalent serum of Leclaine and Valée (see SERA) is possibly a step in the right direction, though he thinks a solution of nucleinate of sodium is superior. Exposure to light and air is one of the best methods of disinfecting wounds. Four layers of ordinary gauze have quite sufficient filtering power to exclude the germs from the air.

REFERENCE.—¹*Bull. de l'Acad. de Méd.* 1915, No. 23, 678.

AUTOLYSIN.

A solution containing non-toxic vegetable proteins has been used in America for the treatment of **Cancer**. The drugs selected contain no toxic alkaloids or active principles. It is apparently claimed that the special therapeutic activity is due essentially to the presence of vegetable proteins. The original mixture contained *Menyanthis trifoliata*, *Melilotus officinalis*, *Mentha crispa*, *Brassica*

alba, *Anemone hepatica*, *Viola tricolor*, *Anthemis nobilis*, *Fructus colocynthis*, *Lignum quassiae*, *Urtica dioica*, *Radix rhei*, and hedge hyssop. With the exception of the mustard and colocynth, which form 20 per cent and 5 per cent of the whole, the herbs are used in approximately equal quantities. At first the mixture was applied as a poultice to superficial cancerous growths, but later a saline extract has been used under the name of 'autolysin.' This is always injected either subcutaneously into sound tissue or directly into the tumour masses. Exceptionally it is given intravenously. The active dose varies from 15 to 90 min. The solution is stated to possess a specific curative action which is manifest after absorption. It produces a local and a general reaction. The former seems to be of an irritant nature, and varies with the dose and immunity. The actual injection produces pain lasting two or three minutes, followed by aching for twenty to forty minutes. With small doses there may be little local swelling, but with larger ones the site of injection becomes red and indurated. In addition to the local irritant action it may produce an anaphylactic reaction similar apparently to that produced by the injection of any other foreign protein. Thus, occasionally an immediate reaction takes place, with redness and swelling of the skin and mucous membrane of the face and mouth, and there may be patchy erythema over the whole body. Occasionally malaise and slight fever are noted even after small doses. The anaphylactic reaction is said to be more liable to occur in patients susceptible to hay-fever. Thin anæmic patients do not show so much local or general reaction as well-nourished subjects. With the larger doses of 30 to 50 min. the reaction may be severe and resemble malaria, with chill, lasting for 10 to 30 minutes, followed by fever (102° to 103°) and subsequently by profuse sweating. When the injection is made directly into the tumour masses or into the blood-stream, those patients who have already received treatment may show immediate anaphylactic symptoms—swelling of skin and mucous membrane of face, itching, headache, temporary difficulty in breathing. In about half the cases there is lumbar pain and severe chill. In addition to these protein reactions the injection produces a leucocytosis, with increase in the mononuclear cells. The red cells also increase in number. It is suggested by Williams and Beveridge¹ that the therapeutic activity of the autolysin injections is due to enzyme liberation from the leucocytes and subsequent proteolysis by the red cells. This proteomorphic theory may briefly be stated as follows: The vegetable proteins introduced into the body act as antigens stimulating the cytogenic mechanism (bone-marrow, spleen, etc.) to vigorous formation of white and red blood-cells. At the same time the tissues produce antibodies which split up the foreign protein. The white cells do not entirely escape, and their destruction liberates enzymes, which may be active in destroying the embryonic type of cell met in cancerous growths. The products of disintegration of the cancer cells after absorption are dealt with by the red blood-corpuscles, which continue

proteolysis and elimination of final products. These authors are not quite satisfied with this explanation, and suggest that the chlorophyll content of autolysin may perhaps play some obscure part in the therapeutic process. The clinical value of autolysin seems to have been studied in a large number of cases. All the authors state that it is specific in action, acting after absorption. In many cases it is of great value. Some types do not respond well to the injections, especially those involving the mouth, pharynx, and stomach. On the other hand, cancers of the uterus, rectum, breast, and skin respond well to treatment with autolysin. The general result of the injection is relief from pain, which is usually seen within ten days and may be more prompt. Odour of foul ulcers shows a marked improvement. The purulent fœtid discharges become sweet in odour, thin in consistency, and non-irritating. Along with these changes there is a general improvement in health, gradual in onset but usually manifest in a couple of weeks. Alterations take place in the tumour masses. External masses may be seen to diminish in size, soften, and become more movable and absorb gradually. The autolysin treatment is stated by Beebe² to be not so much a cure as a measure for relieving symptoms. Beebe summarizes the effects in 100 cases as follows: 15 cases were clinically well, 57 were improved, 25 were not benefited, and 21 died. Favourable reports are also furnished by Pope,³ Williams,⁴ Nicholson,⁵ and Wilson.⁶

•On the other hand, Weil,⁷ who saw many of the cases treated by Beebe in the Memorial Hospital, definitely states that autolysin is quite useless. Of 23 cases treated, 14 died, 8 were discharged unbenefited, and only in 1 case was there apparent improvement. In criticizing the treatment, he states that the injection of autolysin into the tumour masses leads, as do all irritating bodies, to sloughing. The local application of autolysin poultices is similar in action to that of other wet dressings in cleaning the sores. A fairly large proportion of the cases—certainly over one half—were most unfavourably affected by the local injections. Pain was frequently so severe that subsequent treatment was refused. Severe swelling was sometimes seen, and in two cases the treatment seems to have been responsible for fatal hæmorrhage. The general effect on the health and nutrition was so deleterious as to dictate cessation of the treatment in many cases, and far outweighs the doubtful therapeutic benefit. No method seems to have been elaborated yet which will eliminate these serious reactions. Weil's personal belief is that autolysin is useless and adds nothing of value to the methods now generally accepted, while it often aggravates suffering and accelerates the death of the patients.

REFERENCES.—¹*N. Y. Med. Jour.* 1915, ii, 689; ²*Ibid.* 696; ³*Ibid.* 739; ⁴*Ibid.* 741; ⁵*Ibid.* 743; ⁶*Ibid.* 746; ⁷*Jour. Amer. Med. Assoc.* 1915, ii, 1640.

BLOOD, INJECTION OF PATIENT'S OWN.

The injection of the patient's own blood into his subcutaneous tissues is recommended by Raimond and Goubert¹ in **Typhoid Fever**.

They withdraw 20 to 25 c.c. of blood from a vein and inject immediately into the subcutaneous tissue. Speed is necessary to avoid coagulation. Occasionally only a single injection is required, but usually a series of daily injections is necessary to produce a satisfactory action. If six injections have been given without benefit, it is useless to prolong this form of treatment. The injection may produce a local reaction, slight pain and discoloration. A general reaction is also noticed, as a slight rise of temperature often followed in two to four hours by a transitory fall. The pulse improves, the general condition is ameliorated, the tongue becomes more moist, and there is increase in the amount of urine and sweat.

Stimulated by the reports of Gottheil, Fox, and Hilaria of the value of autoserotherapy in **Psoriasis**, J. Scott Willock² has carefully tested this treatment in the Johns Hopkins Dispensary. His clinical results were disappointing. No benefit was obtained in ten cases of psoriasis. One case of chronic **Eczema** improved. Two cases of dermatitis herpetiformis improved markedly after one or two injections, but eventually relapsed under the treatment. His conclusion is that this method has no marked value. The procedure adopted to obtain the blood was to withdraw from a vein at the elbow 80 to 100 c.c., which was centrifuged as soon as it had clotted. From 25 to 45 c.c. of serum was obtained which was then injected intravenously. As a rule, from three-quarters of an hour to two hours elapse between the bleeding and the injection.

REFERENCES.—¹*Bull. Gén. de Ther.* 1915, 205; ²*Jour. Amer. Med. Assoc.* 1915, ii.

BLOOD PLATELETS.

Lyn Dimond¹ has used blood platelets in the treatment of disease. They may be obtained either from the blood of a perfectly healthy person or from that of a healthy person immunized with a vaccine made from the organism producing the disease, or in chronic cases, where the toxæmia is not extreme, the vaccine obtained from the patient's lesions may be sensitized with his own platelets and plasma. The clinical results of administering the platelets are excellent, and examination of the blood shows that there is a marked rise in the antibody content.

The method of preparing plasma and platelets is troublesome. It is fully described in the original article.

For a single dose of platelets and their plasma, from 1 to 5 c.c. up to 30 to 40 c.c. are injected into the connective tissue between the shoulder-blades. This may cause a slight reddening of the skin, which may itch and remain hyperæmic for twenty-four to thirty-six hours.

Sensitizing a vaccine with platelets is done by emulsifying the organism in as small a quantity of saline solution as possible, usually 5 c.c.; The vaccine is killed by heating to 60° C. for half an hour, and is then added to the platelets and their plasma under sterile

paraffin, and exposed to a temperature of 33° C. for ten hours. Then separate the organisms and wash them free of plasma, suspend in a small quantity of normal saline, and preserve in amber-coloured ampoules kept on ice.

When preparing the platelets by preliminary vaccination of a healthy donor with the autogenous causative agent, the blood is withdrawn when the reactions are at their height.

From personal experience the author suggests that the most suitable time for various organisms is as follows :—

<i>Diplococcus pneumoniae</i>	platelets withdrawn	5th day after injection.		
<i>Micrococcus catarrhalis</i>	"	3rd	"	"
Friedländer's bacillus	"	8th	"	"
<i>Bacillus influenzae</i>	"	2nd	"	"
<i>Streptococcus pyogenes</i>	"	3rd	"	"
<i>Bacillus septicus</i>	"	6th	"	"
<i>Bacillus pertussis</i>	"	3rd	"	"

REFERENCE.—¹*Brit. Med. Jour.* 1914, ii, 828.

BLOOD TRANSFUSION.

Ottenberg and Libman¹ publish an interesting review of the indications, results, and general management of blood transfusion. Owing to the general adoption of reliable tests for agglutination and hæmolysis, the operation may now be considered a safe procedure. It is no longer a means of last resort, but has become an ordinary therapeutic remedy for which there are definite indications. The writers base their results on a series of 212 blood transfusions in 189 cases which they have personally observed. In 85 of these cases, transfusion was successful in that the condition of the patient was greatly improved, and in 42 of these it was directly life-saving. The unsuccessful cases number 104, and in these the transfusion either did no permanent good or the patients died of the original disease. The unsuccessful cases are divided into three groups. The first group of 28 cases showed temporary improvement, but subsequently died from a continuation of the disease, at periods varying from several days to eighteen months after the transfusion. This group comprises many different diseases—malignant tumours, pernicious anæmia, dysentery, typhoid fever, and pyogenic infections. The second group of 23 cases consisted of very serious conditions of disease, in which the transfusion was used as a last resort—acute lymphatic leukæmia, diabetic coma, typhoid perforation, brain tumour, uræmia. Of the third group there were 23 cases in which transfusion might have been expected to do good but actually produced little or no benefit—post-operative shock, cholæmic hæmorrhage, purpura. In two cases the transfusion seems actually to have been the cause of death from the introduction of excessive amounts of blood, and in three cases incompatible blood led to fatal agglutination or hæmolysis.

Analyzing the special indications, the authors state that in many cases the transfusion was performed for loss of blood. It was especially successful in the treatment of repeated or prolonged bleeding

due to **Gastric or Duodenal Ulceration**. In 12 out of 14 cases of this type, transfusion was successful, though used when the patient was in a serious condition, with severe anæmia and continued bleeding. In these the transfusion stopped the bleeding, and even the two fatal cases ceased to lose blood, but succumbed to some other complication of the disease. They do not recommend the transfusion in acute first hæmorrhage, except to prevent exsanguination. The cases in which transfusion seems to check hæmorrhage are those of repeated or prolonged bleeding. It is less successful in other forms of gastro-intestinal hæmorrhage. In **Dysentery** it is worth trying a temporizing method, which improves the anæmic condition but does not cure the intestinal disturbance. In **Typhoid Fever** transfusion is indicated to check repeated small hæmorrhages, where it may not only replace the blood lost but also check the bleeding. It seems also to have some value in alleviating the typhoid state.

In connection with **Surgical Operations**, transfusion is of great value. It had brilliant results in three cases of ectopic and three of post-operative hæmorrhage. The most successful applications occurred in the series of 33 cases in which transfusion was done preliminary to operation upon patients whose desperate condition would otherwise have contra-indicated any surgical intervention. In 13 instances the results were decisive and the patients recovered, and in several other cases the transfusion was beneficial, though the patients eventually died as the result of the progress of the disease or from some complication. Unfortunately, transfusion has no effect in removing surgical shock.

In hæmorrhagic diseases transfusion is of value. In 9 cases of severe **Purpura** which were transfused, 2 died unimproved except for the temporary replenishment of blood, 6 recovered completely, and 1 improved. The most striking result was the prompt cessation of the hæmorrhages. The authors have little doubt that transfusion has a definite curative action in purpura. In **Hæmophilia**, transfusion may fairly be claimed to be a specific remedy for the hæmorrhages. In five out of six transfusions performed on five hæmophilics, protracted bleeding, hitherto resistant to all other kinds of treatment, promptly ceased. The benefit is of course only temporary, as the tendency to hæmorrhage returns sooner or later. It is suggested that every individual known to have hæmophilia should have at his command several persons whose blood is known by previous tests to be compatible with his, and who are willing to give it for transfusion. Thus prompt transfusion could be performed for any severe bleeding, and the life of the hæmophilic probably prolonged to the normal span. In other types of disease, where there is a tendency to hæmorrhages, the effects of transfusion are less marked and reliable than in hæmophilia. It proved useless in the bleeding of acute lymphatic leukæmia, pernicious anæmia, and jaundice. In hæmorrhage secondary to infections, transfusion may check the hæmorrhage, but the ultimate result will depend on whether the body can overcome the infection.

The series of 25 cases of **Pernicious Anæmia** enables the following conclusions to be drawn. Transfusion is never curative, but it is a symptomatic remedy which with greater certainty than any other known measure overcomes the chief symptom of the disease—the anæmia. In about half the cases it seemed also to initiate a remission. In 14 of the cases the remission followed the transfusion promptly. These were apparently instances of a more chronic form of the disease. In virulent, rapidly progressive cases, transfusion seemed to have little effect in producing a remission. The amount of transfusion does not appear to be the determining factor, as remissions were seen after very varying amounts of blood. There may be some unknown differences in bloods which dominate the action, and the authors suggest that if a remission occurs with the blood of one donor, the same blood should be used for a subsequent transfusion if it is required. Apart from the effect in producing a remission, the transfusion often produces a striking effect upon the general condition of the patient. The appetite rapidly improves, the mental condition clears up. Glossitis and spinal symptoms are not directly influenced, but in many instances the fever was removed.

Transfusion was tested in 10 cases of **Leukæmia**, 9 lymphatic, 1 myeloid. In the 4 acute lymphatic cases the result was negative in 3, but the other seems to have benefited to the extent that life was prolonged for two or three months. In the chronic cases the results were more satisfactory, a return to more normal blood being seen which lasted from some weeks to several months. The myeloid case was uninfluenced. As the results in chronic leukæmia were obtained with a single transfusion, the authors suggest a further trial with frequent small amounts of healthy blood.

Discussing the *dangers* of transfusion, it is definitely stated that the preliminary test-tube investigation may be relied upon to eliminate the dangers of hæmolysis and agglutination. If possible, the preliminary testing of the interactions of the donor's and donee's blood should be carried out before transfusing. Only in emergency cases should untested blood be used. Hæmolysis is the more dangerous reaction. The authors have had experience of five instances where transfusion of blood whose serum was agglutinative to the patients' cells was performed, and in no case were there untoward symptoms or phagocytosis in the circulating blood. Transfusion of excessive amounts of blood may lead to cardiac failure, pulmonary œdema, jaundice, and hæmaturia. Apart from these serious sequelæ, in about 10 per cent the transfusion is followed by a more or less marked febrile reaction, and in another 10 per cent skin eruptions, usually urticarial, sometimes with a few petechiæ, appear. Neither the fever nor rash was serious, and both disappeared in three days. If too much blood is taken from the donor, he may show repeated yawning, or sweating and pallor, and subsequently thready pulse, semiconsciousness, and vomiting. These signs rapidly pass off without any special treatment.

As regards *technique*, the authors prefer the syringe method, as it is simpler, less alarming to the donor, and permits an exact calculation of the amount of blood. In hæmorrhage, an attempt should always be made to replace as far as possible the blood lost, but a smaller quantity than this will remove collapse and save the patient. In hæmorrhagic diseases a comparatively small transfusion (500 c.c. for an adult) is usually sufficient. In anæmias, where it is intended to replace hæmoglobin, it should be remembered that there is a further rise of 5 to 10 per cent on the following day. In pernicious anæmia a moderate transfusion of 500 to 1000 c.c. is sufficient.

REFERENCE.—¹*Amer. Jour. Med. Sci.* 1915, ii, 36.

BRAIN LIPOID.

Hirschfelder¹ suggests the use of brain lipid as a suitable and inexpensive source of fibrin ferment which is of value as a **Hæmostatic**. A diphosphatide, kephalin, is present in brain tissue, and can readily be extracted with ether, though it is insoluble in alcohol. Ox brain is covered with three volumes of alcohol and shaken up two or three times. The excess of alcohol is poured off, and the tissue is strained by squeezing gently in linen. The residue is then treated with three volumes of ether, shaken vigorously, and filtered, first through cotton and then through filter paper. The clear solution is evaporated on a water-bath, and the yellow residue containing impure kephalin is therapeutically active. It is very effective in effecting coagulation *in vitro*, and clinically it controls capillary oozing rapidly. It is less effective when the bleeding is arterial, as the clot is apt to be washed off before becoming firm. It is useful even in arterial bleeding if the blood forms a pool or collects in a pit or trough in the tissues. The kephalin is applied with a probe, a small quantity being sufficient.

REFERENCE.—¹*Lancet*, 1915, ii, 542.

BUXUS SEMPERVIRENS.

Vevey¹ finds that a tincture of this plant is useful in cases of **Intermittent Hepatic Fever** which prove refractory to quinine. He uses the tincture in 5-gram doses, and states that it gives rapid results in **Angiocholitis**.

REFERENCE.—¹*Bull. Gén. de Thér.* 1915, 236.

CARBOLIC ACID POISONING. (See PHENOL.)

CHAPARRO AMARGOSA.

This drug, long used as a domestic remedy in S.W. Texas, has been employed by Nixon¹ in 12 cases of **Amœbic Dysentery**. It belongs to the *Simarubaceæ*, and its botanical name is *Castela Nicholsoni* (Hook). Its common name is bitter-bush. All parts are bitter to taste and seem to be efficient medicinally. There is a fluid extract on the market, but Nixon used a fresh infusion or decoction of the

whole plant. Clinically it resulted in prompt improvement in the stools, which became normal in a couple of days. He used it as follows: After preliminary administration of magnesium sulphate, 6 to 8 oz. of the infusion are given thirty minutes before each meal, and rectal enemata of 500 to 2000 c.c. twice daily in the knee-chest position. The patient is instructed to retain the enema as long as possible. The treatment is continued for a couple of weeks after symptoms subside. Experiments show that, *in vitro*, the drug even in weak solutions has a special affinity for the protoplasm of *Entamoeba histolytica*. Thus a detannated fluid extract in the strength of 1-10,000 causes immediate cessation of movements, and the amoeba assumes a spherical shape with sharp differentiation of ectoplasm and endoplasm. A solution of 1-100,000 acts in forty seconds, and 1-1,000,000 in two minutes. The action seems a specific one on the *Entamoeba histolytica*, as the drug is not curative in ordinary dysentery or in other parasitic infections.

REFERENCE.—¹*Amer. Jour. Trop. Dis.* vol. ii, No. 9.

CHAULMOOGRA OIL.

Heiser¹ states that chaulmoogra oil given hypodermically produces more consistently favourable results in **Leprosy** than any other form of treatment which he has tried. Crude chaulmoogra oil administered by the mouth is more effective than the refined oil, but produces great nausea when continued for long periods, and in Heiser's experience scarcely anyone can take it for more than three months. It is much easier to administer hypodermically, and is equally valuable. He uses the following mixture:—Chaulmoogra oil, camphorated oil, each 60 c.c.; resorcin 4 grams; these are mixed and dissolved with the aid of heat on a water-bath and then filtered. Weekly injections in ascending doses are used, starting with an initial dose of 1 c.c. and increasing to the point of tolerance. Individual susceptibility varies; some experience a marked reaction in the lesions after even a few c.c., with fever and cardiac distress. The dosage should be regulated so that the action is not too violent. Directly injecting the mixture into large leprous deposits or in divided doses into several small infiltrations, seems to give more rapid improvement. Heiser claims that the mixture produces apparent cures in some cases, causes great improvement in others, and arrests the progress of the disease in almost all instances. It is equally efficacious in all forms of the disease, tubercular, anæsthetic, or mixed.

REFERENCE.—¹*Amer. Jour. Trop. Dis.* 1914, 300.

CHENOPODIUM, OIL OF. (See also ANKYLOSTOMIASIS.)

Bishop and Brosius¹ have tested the value of oil of chenopodium in the treatment of **Uncinariasis**. They conclude that it is more efficacious than thymol. Oil of chenopodium in medicinal doses is non-toxic contrasted with thymol. Administration of the oil is

attended with less inconvenience to the patient, causes less disturbance, can be given at shorter intervals, and therefore cures more rapidly. Comparative tests on the same patients show that chenopodium is a more efficient vermifuge in uncinariasis than thymol. It is also effective against the **Round Worm**, but is quite ineffectual against *Strongyloides intestinalis*, *Trichocephalus dispar*, or trichomonads. For uncinariasis the drug is used as follows: The oil is put up in capsules each containing 8 min. Two capsules are given as a single dose, and each treatment consists of three doses at intervals of two hours. Four hours after the last dose, 2 oz. of castor oil are administered. No dieting is required, and excessive purging is avoided. Consequently the patients do not suffer from the purging and prostration often seen after thymol treatment, when the effects may persist for several days. With oil of chenopodium the patient is little upset, and treatment can be repeated at shorter intervals, e.g., three days. Though it is a more efficient vermifuge than thymol, repetition is usually necessary to ensure a cure. As a rule it is given every sixth day till ova disappear completely from the stools for five or six days, and then a final treatment with chenopodium is given and the first formed stool tested for worms. In some cases as many as seven or eight treatments are required to effect a cure.

REFERENCE.—¹*Jour. Amer. Med. Assoc.* 1915, ii, 1610.

CHLOROFORM.

Hanson¹ has found the cautious inhalation of chloroform of value in the treatment of **Insolation**. He records three cases. While the patient was still unconscious the inhalation was commenced, and in from five to twenty minutes there was rapid improvement, shown by slowing of pulse and respiration, drop in temperature, and return of muscular tonicity.

REFERENCE.—¹*Jour. Amer. Med. Assoc.* 1915, ii, 1277.

CHRYSAROBIN.

Schomberg, Raiziss, and Kolmer¹ communicate some interesting observations on the biochemical properties of chrysarobin. It is possessed of no germicidal action on staphylococci and trypanosomes. Oxidation changes chrysarobin into chrysophanic acid, which is a practically inert therapeutic body. In a dry or moist state chrysarobin is a stable substance, not readily oxidized by exposure to air or light. Suspended in water, it oxidizes readily in the presence of alkalis. The composition of chrysarobin is complex, but probably the activity is due to chrysophenol-anthranol. Chrysarobin has a peculiar affinity for the proteins of the skin, which readily oxidize it even in the absence of atmospheric oxygen, apparently as the result of a chemical interaction. The amino-acids, cleavage products of proteins, appear to be an important factor in this action. The keratins of the skin possess a special affinity for chrysarobin; thus scales of the skin placed in a watery suspension of the drug become

characteristically stained, forming a firm union, resisting the decolorizing action of repeated boiling in acetic acid. The combination of chrysarobin and the skin appears to be accomplished while the drug is undergoing oxidation at the expense of the proteins, and the staining of the skin is in large part due to the oxidation of the drug in the horny layer, though some of it is carried into the deeper layers of the epidermis, even into the corium. Deprived of its reducing powers, chrysarobin at the same time loses its therapeutic value, and the presence of an alkali in an ointment containing chrysarobin considerably reduces its therapeutic action.

The authors are inclined to ascribe the superior therapeutic efficacy of chrysarobin in **Psoriasis** to three factors: (1) Its resistance to oxidation on exposure to air; (2) Its strong reducing action in contact with the skin; (3) The chemical affinity for, and firm union with, the proteins of the skin. It is possible that the therapeutic efficacy depends on the chemical union and abstraction of oxygen, resulting in a restraining influence on the proliferative power of the epithelial cells.

REFERENCE.—¹*Jour. Cutan. Dis.* 1915, 98.

COD-LIVER OIL.

In this country cod-liver oil is administered either as the pure oil or in the form of emulsions. In the U.S.A. it appears that so-called cod-liver oil cordials are on sale. These differ entirely from our emulsions, in that they contain no cod-liver oil but various substitutes. Thus some are stated to contain all the valuable constituents of the oil without the oil itself, i.e., are extracts of the cod oil livers. Street¹ has thought it worth while to investigate the nutrient value of several of these 'oilless' preparations. For this purpose he selected white rats as test animals. If fed for a short time on a mixture of purified protein, lard, starch, and protein-free milk, young rats maintain their normal rate of growth; but if the diet is continued for sixty to a hundred days or more, normal growth ceases, the animals become stationary or lose weight, and eventually die unless a change is made in the diet. The substitution of butter fat, egg-yolk fat, or cod-liver oil for some of the lard in the diet brings prompt recovery and continuation of normal growth. In his experiments Street found that the 'oilless' substitutes were not able to exert this saving influence. It is only fair to the 'oilless' preparations to point out that though they are fairly strong alcoholic preparations, Street had evaporated off the alcohol before feeding the preparations to his rats.

REFERENCE.—¹*Jour. Amer. Med. Assoc.* 1915, i, 638.

COLLOIDAL GOLD.

Busquet¹ describes the pharmacology of a medium strong colloidal solution of gold, obtained by fine pulverization of gold oxide, as follows: The solution is blue in colour, and was investigated in three strengths, containing respectively 0.00025 gram, 0.001 gram, and 0.01 gram per

c.c. Its toxicity is low. Rabbits survive 0.03 gram per kilo body-weight; 0.04 gram per kilo kills in several hours, while 0.05 gram kills immediately. Thus it is at least ten times less toxic than gold chloride. The therapeutic dose for man is 1 c.c. of the 0.00025 gram solution = 0.0000036 gram per kilo for a man of 70 kilos weight. Thus there is little risk of toxic action, as the toxic amount for the rabbit is 11,000 times greater. The pharmacological investigation of gold colloid gave largely negative results. It is not antiseptic, and apparently does not act upon toxins. The coagulability of blood is not affected either *in vitro* or in the intact vessels, and it requires a solution 1400 times more concentrated than that used therapeutically to produce laking of blood. The intravenous injection produces no effect upon the secretion of saliva, bile, pancreatic juice, or urine. The cardiovascular action indicates in small doses an absence of action. Small amounts do not kill the perfused surviving heart of the rabbit. Stronger solutions, e.g., 0.01 gram to 1 litre of Ringer-Locke, produce a cardiotonic action, very marked and prolonged. In the dog the injection of 0.0002 to 0.0005 gram produces slowing, with increased systole and rise of blood-pressure, and greater relaxation in diastole. The bradycardia is immediate, but passes off abruptly in five minutes. It is not nervous in origin, as the vagus still remains active. Gold colloid penetrates as such readily into the tissue-cells, and is slowly eliminated by the blood and kidneys.

The intravenous or intramuscular injection of colloid gold is warmly recommended by Belbèze² in severe **Infection of Wounds, Extensive Injuries, and Prolonged Suppurations**. He used it in seventeen cases, giving in all 316 injections. For intravenous dose he uses $\frac{1}{4}$ to 1 c.c., and 2 to 4 c.c. for the intramuscular route. Intravenous injection produces a rapid action. In twenty to thirty minutes there is severe shivering, lasting for about half an hour. This is followed by a sensation of heat and critical sweating. Temperature falls fully 1 to 2° C. As a rule, three or more injections are required to produce a permanent lowering of a febrile temperature, especially if of the swinging hectic type. The administration of the drug improves the general condition and local lesions. The action of intramuscular injections is analogous but less rapid.

REFERENCES.—¹*Presse Méd.* 1915, 356; ²*Bull. Gén. de Thér.* 1915, Jan. 121.

COLLOIDAL SILVER. (See SILVER, COLLOIDAL, p. 32.)

COPAIBA.

Stockman¹ has tested clinically the resin and oil obtained from one sample of copaiba, to determine which constitutes its active constituent. From observations of patients suffering from gonorrhœa, he concludes that the resin of copaiba in doses of 15 to 30 gr., given thrice daily, emulsified with mucilage, is without action upon the urethral discharge. The resin produced no urethral irritation. Subsequent administration of the oil produced in the same patients

distinct improvement, doses of 15 min. being given thrice daily. This was more marked when the dosage was increased to 15 min. six times daily. Both resin and oil are excreted in the urine, but the resin is nearly devoid of antiseptic properties, whereas the oil exerted a distinct effect in retarding putrefaction and in hindering the growth of certain organisms, which were artificially added to the sterilized urine. For these reasons the conclusion is drawn that the therapeutic efficacy of copaiba depends upon the oil, and the resin is practically inert as a genito-urinary antiseptic.

REFERENCE.—¹*Brit. Med. Jour.* 1915, ii, 128.

DAHLIA.

Ruhräh¹ discusses the action of various aniline dyes as antiseptics. He points out that acid dyes are practically devoid of antiseptic action, but strongly basic dyes are all more or less antiseptic. He has found that watery solutions of dahlia are efficient antiseptic local applications for **Streptococcic Infections of the Throat**. Even in saturated solution (4 per cent) it is not irritating to the skin or mucous membranes. The drug seems to penetrate only to short distances, and is useless for deeper-seated inflammation, but is valuable for superficial involvement of the mucous membrane. It is not painful, does not produce irritation, and is markedly antiseptic. Garments inadvertently stained can as a rule be readily decolorized by washing immediately in cold water.

REFERENCE.—¹*Amer. Jour. Med. Sci.* 1915, i, 661.

DIGITALIS.

In a paper on the newer ideas concerning digitalis, Horatio C. Wood¹ points out that pharmacologists often fail to distinguish between toxic effect and the action of therapeutic doses of drugs. Notably in the case of digitalis, very large doses were employed by pharmacologists in investigating the action on the lower animals. Hence arose erroneous conclusions regarding the therapeutic effects of digitalis. The usual claims made for the drug were that it reduced the pulse-rate through stimulation of the inhibitory mechanism, increased the force of contraction of the heart, and narrowed the lumen of the vessels, partly through a vasoconstrictor action and partly by a direct effect upon the unstriped muscle fibres. Elevation of blood-pressure was ascribed partly to increased strength of the cardiac contraction and partly to the vasoconstriction. These were the results of administering large quantities of the drug. Recent work has shown that the effect of therapeutic doses on man is different from this supposed action. Arterial tension is not raised by therapeutic doses, though probably the drug has some slight effect upon blood-pressure; e.g., the diuretic action is probably indicative of a change in the calibre of the renal vessels. In man the most constant and earliest apparent effect of digitalis is slowing of the

pulse. Wood thinks that, except after very large doses, this is due purely to stimulation of the inhibitory mechanism. He knows of no convincing proof that therapeutic doses in man have any other action upon the heart than exciting the inhibitory mechanism. Nearly all the abnormal varieties of heart-beat which are described as evidence of the action of digitalis on the heart can be produced by stimulation of the vagus. Wood sums up the action of small doses of digitalis upon the normal circulation as a stimulation of the cardio-inhibitory mechanism, with probably a slight increase of vasomotor tone, but not sufficient to cause any rise in the blood-pressure. The increased vigour of contraction and muscle tone due to a direct action on the heart muscle, while perhaps manifestations of the action of therapeutic doses, are later phenomena than the retardation of pulse-rate.

Hatcher and Eggleston² state that, contrary to the opinion ordinarily held, the infusion of digitalis keeps its potency fairly well. When prepared and kept with ordinary care, it undergoes no important change within a week. If special care is taken, it retains its efficacy for several weeks. A test experiment in which a sample was opened frequently and small quantities removed—i.e., comparable to what occurs in practice—showed that there was no loss of activity in three weeks. The growth of moulds in the infusion seems to lead to rapid deterioration.

REFERENCES.—¹*Ther. Gaz.* 1915, i, 381; ²*Jour. Amer. Med. Assoc.* 1915, ii, 1903.

DISINFECTANTS. (See also ANTISEPTICS.)

Ellice McDonald¹ recommends as a most reliable disinfectant for the skin of the hands and abdomen the following solution, which he claims is superior to alcohol, perchloride of mercury, and iodine: Acetone (commercial) 40 parts, denatured alcohol 60 parts, pyxol 2 parts. This solution is reasonably cheap, does not irritate the skin, is efficient, and does not interfere with the healing of wounds. The acetone is a fat solvent, the alcohol is a good vehicle, and the pyxol a powerful germicide, twenty times as efficient as carbolic acid. Pyxol is a dark liquid extract from coal-tar creosote, which forms a white emulsion with water and a mahogany-coloured solution with alcohol and acetone. Its germicidal activity is not impaired by pus, serum, soap, or albuminous material. It is said to consist of 40 per cent pyxol oil, 30 per cent neutral hydrocarbon oil, and 30 per cent saponified vegetable oil, and is free from carbolic and cresylic acids. When using McDonald's solution, preliminary washing with soap and water is not necessary. To sterilize the hands, the solution is used in a vessel sufficiently large to admit the hands. For the nails a nail-brush is used, but little mechanical friction is required, and it is sufficient to rub the hands and arms with a gauze swab for a minute, after which the hands are immersed in the solution. To sterilize the skin of the abdomen, the solution is rubbed on for two minutes before operation, after the patient is under ether, without any preliminary

washing. It speedily evaporates from the skin. He has used the solution for over a year with uniformly satisfactory results, and has discarded the use of gloves, but has used a skin varnish.

McMullen² is highly satisfied with McDonald's solution, which he believes is the most efficient method of sterilizing the skin at our disposal at the present time. He finds that healing takes place more rapidly than under iodine skin disinfection. McMullen uses the solution as follows: The field of operation is prepared the night before operation by shaving, and washing with green soap, water, and alcohol, and is then covered with a sterile towel and left till the next day, when it is rubbed for two minutes with the solution at the operation. The surgeon's and assistants' hands are prepared by scrubbing with soap, water, and alcohol, followed by two minutes' treatment with McDonald's solution. In eight months, in 276 major operations, laparotomies and hernias, there were only seven skin infections. Stanton³ also praises the solution. It is non-irritating, and water up to 10 per cent does not interfere with its action, so that it can be used to scrub the hands or skin while still wet after shaving or washing. The solution is an excellent cleanser, and can be used instead of soap and water to cleanse the part. It does not stain, and evaporates rapidly, so that there is no need to protect peritoneal surfaces from the skin prepared with the solution. It is cheaper than tincture of iodine. During fifteen months in which the solution has been in use, there have only been two infections in 240 otherwise clean cases. He also states that there is no evidence of chemical irritation, and that healing is more rapid than with other methods of skin disinfection.

REFERENCES.—¹*Surg. Gyn. and Obst.* 1915, ii, 82; ²*Ibid.* 87; ³*Ibid.* 89.

DRUGS, ADMINISTRATION OF.

Pilcher¹ states that many drugs, e.g., solution of potassium iodide and weak alkaloidal solutions, are readily absorbed when injected into the nasal submucosa of the dog. As a rule he injects into the submucosa of the anterior turbinates. He suggests that a similar plan may prove useful in man where a very rapid absorption is required and where it is impossible to administer the drug intravenously.

Paulson² draws attention to the obvious advantages for war purposes of sublingual medication as compared with hypodermic administration of drugs. There is no risk of dirty needles, and the administration is safe and simple. He states that the mucous membrane of the sublingual region readily absorbs drugs put up in the form of hypodermic tablets.

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1915, ii, 232; ²*Brit. Med. Jour.* 1914, ii, 541.

ECBOLIC DRUGS.

Lieb¹ has investigated the action of ecbolic drugs on the Uterus of pregnant and non-pregnant lower animals. As regards *ergot*, he

finds considerable variation in its action. The pharmacological action is due to several constituents, of which ergotoxin is specific, but is chiefly exerted on the blood-pressure. It has an action on the uterus, increasing the rate and strength of contraction, but this does not account for the full activity of ergot on the uterus. Beta-imidoazolyethylamine, para-hydroxyphenylethylamine, and the other sympathonimetic amines are products of putrefaction which occur during the manufacture of galenical preparations. Each of these products has pharmacological activity, and stimulation of the uterus is characteristic of them all, but in obstetric work no single one of the products can replace the whole drug.

As regards *pituirrin*, he holds that the extract of the posterior lobe of the pituitary gland is the most reliable ecbolic which the obstetrician has at his command. *Quinine* has a stimulating action on the isolated uterus, and may be used to induce or strengthen labour pains. Even in dilute solutions of 1-100,000 the isolated uterus responds with increased rate and strength of contraction, and a moderate improvement in tonus. Stronger solutions, from 1-50,000 upwards, produce a tetanus and spasm of the uterus. Weak solutions of 1-50,000 seem to have some power of inducing contraction in an isolated uterus which was inactive. The *isoquinoline group*, which includes hydrastine, narcotine, and laudanotine, have a strychnine-like action on the spinal cord. Less toxic members of the group are hydrastinine and cotarnine, and in the isolated uterus they affect the contractions. In strong solutions they cause an increase in the rate of contraction and tonus, and, on washing out the drug, the rhythm is altered, the contractions becoming slow and characterized by a short tetanus followed by slow but complete relaxation. These drugs have very slight action in the circulation, and their successful action in menorrhagia and metrorrhagia probably depends on the direct action on the uterus. *Viburnum* stimulates the isolated uterus, but its clinical effect in dysmenorrhœa appears to depend on its depressant action on the central nervous system.

REFERENCE.—¹*Amer. Jour. Obst.* 1914, vol. lxix, No. 1.

EMETINE HYDROCHLORIDE. (See also AMŒBIASIS, ORAL SEPSIS.)

The field for this drug is constantly being increased. It is stated to be a specific for **Pyorrhœa Alveolaris** and to prove curative in many cases of **Tonsillitis**. More recently Weinstein,¹ after experimenting in a small series of cases, states that the hypodermic injection of $\frac{1}{2}$ gr. of emetine hydrochloride controls **Hæmorrhage following Nasopharyngeal Operations**. He gives the injection immediately after the operation, and rarely requires to use more than one dose. He is quite unable to explain how the hæmostatic action is produced, as these doses do not affect either the clotting-time of the blood or the general pressure, so that he believes it must exert its action on the capillaries.

Dutcher² reports that emetine hydrochloride proved ineffectual in

a case of balantidosis. The drug was given hypodermically in doses increasing from $\frac{1}{3}$ gr. to 1 gr. thrice daily. Lynch³ also found emetine useless in trichomoniasis of the mouth and vagina.

Nathan Barlow⁴ states that the only effective treatment for **Craigiasis**, an infection of the body with protozoa belonging to the genus *craigia*, is the administration of ipecacuanha internally or emetine hypodermically. The treatment must be pushed to large doses and continued for a long time. Except in hepatic cases, oral administration of ipecacuanha is more promptly efficient than emetine. To ensure permanent cure, occasional flushing of the bowels with saline laxatives is necessary to remove cysts and flagellates. If ipecacuanha produces diarrhœa, opium should be given. In **Hepatic Abscess**, 2 gr. of emetine a day for two weeks is efficient.

Lyons⁵ produces the following evidence to show that ipecacuanha and emetine when administered by the mouth do not appear in the stools. The sterilized filtered stools of patients receiving ipecacuanha do not prevent the growth of amœbæ *in vitro*. Further, though emetine *in vitro* kills the *Entamœba coli*, it is not curative when administered by the mouth. Apparently only those amœbæ which can penetrate the intestinal wall are susceptible to the action of emetine, which seems to act on them through the blood-stream. Thus amœbæ limited to the inside of the intestinal tract are not affected by ipecacuanha or emetine administered either orally or subcutaneously, and similarly the *E. histolytica* in the resting carrier stage (encysted form), in which it is apparently a parasite restricted to the intestinal tract, is immune to the action of ipecacuanha and emetine. He points out that emetine is slightly acid in reaction, hence it is irritating to the tissues when injected in doses of 1 gr. and upwards. Intramuscular injection is apt to produce painful infiltrations which retard the absorption and limit the action of the drugs.

REFERENCES.—¹*Med. Rec.* 1915, i, 102; ²*Amer. Jour. Trop. Dis.* 1915, Apr. 663; ³*Ibid.* 627; ⁴*Ibid.* May; ⁵*Ibid.* July.

EXPECTORANTS.

Miller¹ has tried to solve the problem of the clinical value of expectorants by experimenting on animals. Previous experimenters, using doses considerably larger in proportion than those employed in clinical medicine, claim to have demonstrated, in animals, that the ammonia salts, iodides, antimony, and ipecacuanha have an expectorant action. Miller, using moderate doses administered by the duodenum comparable with those quantities used clinically, has failed to demonstrate any increase in the bronchial secretion of the dog after the use of ammonia salts, apomorphine, and emetine. His experimental method consisted in severing the trachea low down and introducing weighed rolls of filter paper into either the lower or upper end of the trachea. The increase in weight is determined in two preliminary periods of ten minutes. Then the drug to be tested

is given, and the subsequent increase in weight of filter paper is noted during subsequent periods of ten minutes.

REFERENCE.—¹*Amer. Jour. Med. Sci.* 1914, ii, 469.

FULLER'S EARTH. (*See also* STRYCHNINE, COLLOIDAL.)

Fuller's earth is used extensively for removing colouring matter from oils. Recently Lloyd discovered that it has a similar action in removing alkaloids from solutions and in removing or concealing the bitter taste of alkaloids. This effect is produced by the finest particles of the earth. A special fine product of fuller's earth obtained by elutriation is known as Lloyd's reagent. Fantus¹ has investigated the relationship between fuller's earth and alkaloids. He finds that marked differences exist between the effects of different samples of fuller's earth. Pure kaolin is almost devoid of the property of absorbing alkaloids. The alkaloids also exhibit great differences in the ease with which they are absorbed on shaking the solution with fuller's earth. Morphine and quinine are easily removed, whereas cocaine and nicotine require double the proportion of fuller's earth to remove them, and aconitine and strychnine salts require still more. The most difficult salt to remove, so far investigated, was colchicine hydrochloride. The compound formed by the fuller's earth and the alkaloids is not broken up by acids or ferments, but in the presence of weak alkali there is dissociation. Consequently the alkaloidal fuller's-earth compounds are not absolutely non-toxic when administered by the mouth, as in the alkaline intestine the compounds are dissociated and the liberated alkaloid is absorbed. The toxic action is as a rule delayed and more gradual. Comparative experiments show that in the lower animals fuller's earth has antidotal value in morphine, nicotine, cocaine, and ipecacuanha poisoning, and to a less extent in strychnine and aconitine poisoning. The addition of an acid salt increases the antidotal action by delaying the alkaline dissociation of the alkaloid. Thus acid phosphate of sodium markedly increases the antidotal action in the lower animals, especially if it is given in sufficient quantity to produce rapid purgation. Hitherto not much use of these properties of fuller's earth has been made in human therapy, but Fantus points out that the administration of an alkaloidated fuller's-earth compound may produce an action low down in the bowel, as the compound is not broken up in the intestine and the alkaloid will be less rapidly absorbed. There is reason to believe that in human beings the absorptive powers of fuller's earth will be similar to that shown in animals. Experiments with methylene blue show that the addition of fuller's earth postpones the discoloration of the urine and greatly lessens its degree. Already use has been made of the property of fuller's earth of removing the bitter taste of alkaloids.

REFERENCE.—¹*Jour. Amer. Med. Assoc.* 1915, i, 1838.

GOLD, COLLOIDAL. (See COLLOIDAL GOLD, p. 13.)

HORDENINE.

Mercier and Caussé-Ratuld¹ have used the sulphate of hordenine intravenously in twenty-five cases of **Typhoid Fever**. They have given in all 126 injections without any accident. An isotonic solution of the sulphate in physiological saline is used, containing 0.5 per cent of the alkaloidal salt. The dose of 48 c.c. (0.24 gram of hordenine sulphate) intravenously is well borne. The maximum daily dose was 75 c.c. The intravenous injection may produce an immediate reaction, with heat in the head, rarely transient syncope, disturbed respiration with sense of oppression, and slowing and increased amplitude of pulse. There is a late reaction which is the real therapeutic response and is shown in the circulation. The pulse is slowed and made more regular, without any increase in blood-pressure. Subjective disturbances are relieved, e.g., palpitation, sweats, and chills. The drug also stimulates the appetite, and has an action on the nervous system, which is shown by general stimulation of the cerebrum, disappearance of the typhoid state, reappearance of normal sleep. The writers consider the drug an energetic, rapid cardiotonic remedy of slight toxicity. For use in cardiac collapse and adynamy in acute infective fevers they advise a combination of adrenalin 0.5 mgm, sulphate of hordenine 12.0 cgrams, glucose serum (4.7 per cent) 250 c.c.

REFERENCE.—¹*Bull. de l'Acad. de Méd.* 1915, No. 22, 661.

KAOLIN.

Robin¹ states that in the Balkan War he found a kaolin mixture of value in **Dysentery**. He used a powder, 94 parts kaolin, 5 parts gum arabic, and 1 gum tragacanth, given frequently in tablespoonful doses in a little water, using 100 to 200 grams of the powder in 24 hours.

REFERENCE.—¹*Bull. Gén. de Thér.* 1915, Jan. 148.

LACTIC ACID BACILLI.

Bendick¹ has investigated a number of commercial preparations of *Bacillus bulgaricus* with unfavourable results. He finds that only a small number of the preparations contain anything like the number of organisms represented by the manufacturers. Many are sterile, containing no living organisms. Stained smears are of no value, as most of the germs represented are dead. The best preparations were found to be broth cultures obtained direct from the manufacturers. Tablets are useful if the product is to be conveyed for a considerable distance. Some of the tablet preparations are potent, but many are sterile and some are heavily contaminated. He suggests that the manufacturers should send out the preparations with the date of manufacture marked, and a statement of how long the preparation is potent. The preparations should be kept in a suitable ice-box as much as possible till they are used.

Lloyd-Williams² insists upon the clinical value of lactic acid therapy

in **Bacillus Coli Infections**. Lactic acid added to the extent of 1 per cent to gelatin culture media inhibits the growth of *B. coli*, and similarly the lactic acid produced locally by growing lactic acid bacilli inhibits the growth of *B. coli*, as can be shown by inoculating MacConkey gelatin plates with strokes of the two organisms crossing at right angles. Both organisms grow except at the points where the strokes cross. Here mixed growth is inhibited. He records several interesting surgical cases in which the local application of lactic acid, either as a 10 per cent aqueous or glycerin solution, markedly improved local purulent conditions due to infection with *B. coli*. These cases show the value of lactic acid in suppurative abdominal conditions due to infection with *B. coli*.

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1915, i, 809; ²*Middlesex Hosp. Jour.* 1915, Feb. 206.

MAGNESIUM CHLORIDE.

Delbet and Karajanopoulou¹ state that in test-tube experiments the addition of this salt in the strength of 1.21 per cent increases the phagocytic activity of white blood-corpuscles. Similarly, when the drug is injected into the blood-stream or introduced otherwise, the phagocytic power of the circulating blood is increased. They state that in the strength of 1.21 per cent the solution of magnesium chloride is non-toxic for animals when injected intravenously. They suggest the phagocytic stimulant properties of the drug may be taken advantage of in dressing wounds or by infiltrating wounded areas.

REFERENCE.—¹*Bull. de l'Acad. de Paris*, 1915, 266.

MERCURY, PERCHLORIDE OF.

Nathan Barlow¹ gives a short preliminary account of the action of intravenous injection in **Malaria**. He used slightly less than $\frac{1}{4}$ grain in a case of tertian fever six hours before the paroxysm was expected. There was no paroxysm, but a gradual rise of temperature, with fall by lysis, and no further development of malaria. He contrasts the action of perchloride of mercury and quinine as follows:—

PERCHLORIDE.	QUININE.
Retards amœboid movements	Movements more active
Growth checked	Increased
Only very few nearly fully developed schizonts proceed to full development	Nearly all do.
Mercury destructive to all stages of parasites	Only destructive to partly grown schizonts

Gametes are not promptly affected by either drug, but thirty hours after intravenous use of perchloride they disappear entirely.

REFERENCE.—¹*Amer. Jour. Trop. Dis.* 1915, ii, No. 12.

MERCURY SALICYLATE.

Nelson and Anderson¹ have used hypodermic injections of mercury salicylate in the treatment of **Syphilis**, and find that it has practically

no effect upon the Wassermann reaction. They are the surgeons to a military prison, and consequently are in a favourable position for ensuring that treatment is thoroughly carried out. In the 50 cases which form the present series, no other form of treatment was or had been used. Though the objective signs of the disease disappeared under the mercury, the serum reaction was not affected. The dose of mercury salicylate was $1\frac{1}{2}$ gr., and the patients were kept full to saturation with the drug. Despite this, in 21 cases which received treatment for eight months, none of the Wassermann reactions became permanently negative, and all were positive at the end of eight months, though a few cases had been occasionally reported as negative at the monthly testing of the reaction. The remaining 29 cases received treatment for from four to seven months, but in only 2 was the Wassermann reaction negative at the final monthly serum examination. The authors conclude that if the Wassermann reaction is to be taken as an indication of syphilis, and of value as a guide in the control of the disease by treatment, then it is certainly fair to believe that mercury salicylate used hypodermically in full doses for many weeks has little, if any, real influence on the disease.

REFERENCE.—¹*Jour. Amer. Med. Assoc.* 1915, ii, 1905.

NEOSALVARSAN. (See SALVARSAN.)

NITRE, SWEET SPIRIT OF.

Marshall and Gilchrist¹ have investigated the composition of spiritus ætheris nitrosi with the object of determining what is the most important therapeutic constituent. Sweet spirit of nitre is of complex composition, and contains, in addition to ethyl nitrite, some ethyl nitrate, paraldehyde, acetaldehyde, and of course alcohol. If not acid, or if neutralized, it rapidly becomes acid and develops small quantities of nitrous, nitric, and acetic acids. From their investigations Marshall and Gilchrist support the commonly accepted view that the ethyl nitrite is the important constituent. The other ingredients play only a subordinate rôle, of little practical importance. They note that sweet spirit of nitre does not keep well in opened, partially empty bottles. Dilution with water leads to rapid loss of ethyl nitrite, and therefore they recommend that sweet spirit of nitre should be prescribed as such and diluted just before administration.

REFERENCE.—¹*Brit. Med. Jour.* 1915, ii, 125.

OPIUM.

Macht¹ has investigated the effect of the individual opium alkaloids on the coronary artery and the coronary circulation. Morphine produces a moderate, narcotine a more marked, and papaverine the most marked dilatation. Codeine has less action in dilating, and narceine and thebaine are almost devoid of dilating action. These results are obtained by immersing rings of fresh pig's coronary artery in Locke's or Ringer's solution and adding the alkaloid. The effect

of adding two alkaloids of apparently similar action is somewhat unexpected. Thus the combination of the two vasodilating drugs morphine and narcotine results, not in a greater dilatation than with either alone, but in almost abolishing the dilating influence. Similarly the combination of morphine and papaverine in the proportion found in opium, reduces greatly the vasodilatation. On the other hand, codeine and morphine in combination, or narcotine and papaverine, still act as vasodilators. As is well known, the opium alkaloids belong to two groups: one series, to which papaverine, narceine, and narcotine belong, contain the benzyl-isoquinoline nucleus, and the other group, comprising morphine, codeine, and thebaine, contain the pyridine-phenathrene nucleus. It appears that a combination of two members of different groups inhibits the vascular dilatation. The vasodilatation was also demonstrated for the individual alkaloids by perfusion through the coronary arteries and by estimating the rate at which blood flowed from the punctured coronary vein. In these cases too, the neutralizing action of combining the alkaloids from two groups was demonstrable. Macht points out that papaverine is the most active vasodilator of the opium alkaloids, and it also has quite an efficient action as an analgesic. It would be interesting to test its action clinically in **Angina Pectoris**. Papaverine has no depressant action on the heart, and is less depressant to the respiration than morphine.

REFERENCE.—¹*Jour. Amer. Med. Assoc.* 1915, i, 1489.

OXYGEN INJECTIONS.

Hewitt¹ is very favourably impressed with the value of subcutaneous injections of oxygen in cases of **Dyspnoea** arising from such causes as bronchitis, pneumonia, œdema of the lungs, bronchial asthma, etc. He narrates several illustrative cases in which this treatment is claimed to have been efficacious. A much more guarded verdict is given by McCrae,² who was led to try the method as the result of Hewitt's claims. While Hewitt employs the gas freshly generated by immersing solid blocks of sodium peroxide in water, McCrae used gas obtained from the ordinary high-pressure oxygen cylinder. Under low pressure the gas is allowed to escape into the subcutaneous tissue through a small hollow needle till a lump about double the size of the closed fist or about half the size of a football is obtained. This develops in about half to one minute. The needle is then withdrawn and the opening sealed with adhesive plaster. Absorption is rapid; in a few minutes the lump disappears, though pressure will demonstrate subcutaneous emphysematous crepitation for some hours. In pneumonia McCrae's results were very disappointing, but in **Cardiac and Renal Dyspnoea** the comfort obtained was usually notable. In one case of **Post-operative Collapse** with great œdema of the lungs the injections seemed to save the patient's life. As the procedure is simple and easily carried out, it seems a desirable additional provision against the accidents of anæsthesia. McCrae

enumerates the following states which have proved amenable to the use of the gas : (1) Accidents from anæsthesia ; (2) Œdema of the lungs or glottis, or accidental interference with respiration by disease of the upper part of the respiratory tract ; (3) Marked dyspnœa with deficient oxygenation as in cardiac and renal disease ; (4) Asphyxia of infants at birth ; (5) Syncope ; (6) Electrocution.

REFERENCES.—¹*Med. Press and Circ.* 1914, ii, 646 ; ²*Amer. Jour. Med. Sci.* 1914, ii, 836.

PARAFFIN.

Bastedo¹ has conducted, on behalf of the Therapeutic Research Committee of the Council on Pharmacy of the American Medical Association, an investigation into the therapeutic action of various types of liquid paraffin. Samples of the best obtainable light and heavy Russian liquid paraffin and of an American brand were sent out to a number of medical men for clinical testing. No therapeutic difference was detected between the light and heavy oils ; hence the choice of a suitable oil is largely a matter of taste.

Pritchard² makes some interesting clinical claims for liquid paraffin in addition to the ordinary one that it lubricates and softens the fæces. He thinks it may do good in over-eating. By facilitating the passage of the unabsorbed food it regulates metabolism. In children and in infancy especially, he finds an emulsion of petroleum a very serviceable remedy. It is excellent in overcoming the spasmodic state called **Wind**. In **Thread-worms** the drug keeps the worms and their ova on the move, and thus prevents the ova developing to maturity. Like the previous American writer, he finds no essential difference in the action of various brands of paraffin preparations on the market, but it is best to order it under the official name of petroleum liquidum purum. For those who take the oil every night, he advises ordering it by the gallon. To suit the individual taste the preparation may be coloured with chlorophyll and flavoured with menthol or essence of peppermint. The dose is of course a matter of individual experiment, but as a general rule one to two tablespoonfuls taken before going to bed is sufficient. The period taken for the oil to appear varies ; in some cases as long as forty-eight hours is necessary. As to the value of emulsifying the paraffin, he points out that an emulsion mixes more readily with the fæces, whereas the pure oil may merely coat their surface. Thus, in order to prevent the formation of hard scybalous masses he advises the use of an emulsion. Of course emulsions are dearer and contain relatively less of the oil, so that the dose is more bulky. But even for infants this can readily be overcome by ordering a suitable dose (half to one teaspoonful) with each feeding. It is highly important to see that the emulsion used contains no additional drug, e.g., hypophosphite, as with the larger amounts required of the emulsion too much of these additional drugs may easily be administered inadvertently.

A suitable formula for preparing an emulsion in bulk is the following :—

R. Paraffin. Liq. (B.P.)	33 parts	Olei Cinnamomi	0.10 parts
Acid. Benzoic.	0.05 „	Decoct. Chondri	
Glusidi	0.05 „	Crispi	ad 100.0 „

This cannot be made satisfactorily in quantities of less than one gallon, but it is less expensive than the ordinary emulsions, as the decoction of Irish moss is a cheap emulsifying agent.

At the present time, when drugs are becoming so expensive, it is interesting to note that Pritchard states that a very nice confection of vaseline can be made by rubbing it up with casein and chocolate. It forms an efficient laxative.

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1915, i, 808 ; ²*Pract.* 1915, 492.

PHENOL.

Macht¹ has investigated on cats and dogs the treatment of carbolic poisoning. He used various substances to wash out the stomach, and finds that a strong solution of sodium sulphate is the most satisfactory. Next come plain water and aqueous solution of alcohol. The efficacy of lavage depends very largely on the time which has elapsed and the amount of poison introduced. Food in the stomach increases the chances of recovery. Alcohol has some slight action in modifying the toxic action, provided it is used before the phenol is absorbed. Thus animals intoxicated with alcohol withstand phenol better than normal animals. Probably this is due to a greater affinity of the nerve cells to alcohol than to phenol. If toxic symptoms of phenol have occurred, alcohol is useless and probably harmful.

REFERENCE.—¹*Johns. Hop. Hosp. Bull.* 1915, 98.

PITUITRIN.

The galactagogue action of pituitrin has been investigated by Sutherland Simpson and Hill¹ on a young healthy woman nursing her second baby. In the fifth month of lactation the injection of 1 c.c. of pituitrin was followed ten minutes afterwards by a marked increase in the milk secretion. The action was rapid, as after a latent period of twenty to thirty seconds the milk could be felt coming into the breasts, and a few minutes later colicky pain in the abdomen was noted. The milk secreted was increased both in amount and fat content, but measured over the twenty-four hours there was no increase in the total amount of milk, though the fat content was slightly up. In cows² the intravenous injection of the posterior part of the pituitary gland produced a similar action, viz., rapid increase in amount and fat content of the milk but no permanent increase in the twenty-four hours' quantity of milk. In goats³ the continued administration of pituitary extract eventually produces a certain degree of immunity as regards the galactagogue action. Further studies⁴ on the mammary gland of the bitch indicate that the galactagogue action of pituitary gland is purely a local pheno-

menon on the secretory structures in the gland. It is not due simply to a stimulation of the muscle fibres removing rapidly preformed milk.

Lieb⁵ has investigated the action of the extract of the posterior lobe of the pituitary gland on the human surviving uterus and tubes. He claims that there is a different effect produced on the pregnant from that on the non-pregnant organ. On the non-pregnant uterus or Fallopian tube the extract of pituitary gland has no effect, whereas in the parturient organs its effect is invariably to increase the contractions both in rate and strength. He is inclined to ascribe the alteration in response under the pregnant and non-pregnant conditions not to an alteration in the innervation during pregnancy, whereby the motor innervation becomes predominant, but to a preliminary sensitization by some hormone developed during pregnancy. A subsequent paper⁶ confirms his view and reproduces tracings which indicate that the addition of pituitrin increases the strength and rapidity of the uterine movements and increases the tonus greatly.

REFERENCES.—¹*Amer. Jour. Phys.* 1914, Oct. No. 3; ²*Ibid.* 1915, Feb.; ³*Proc. Soc. Exper. Biol. and Med.* 1914, Feb.; ⁴*Quart. Jour. Exper. Physiol.* 1914, Feb.; ⁵*Proc. Soc. Exper. Biol. and Med.* 1914, Oct.; ⁶*Amer. Jour. Obst. and Dis. of Women and Childr.* lxxi, 1915, No. 2.

QUININE AND UREA HYDROCHLORIDE.

Amster¹ strongly recommends this preparation as a **Local Anæsthetic**. Using a freshly prepared solution containing 0.125 to 0.25 per cent to which a few drops of 1-1000 adrenalin hydrochloride is added, he has performed 200 serious operations. The chief advantage of the solution is that it is non-toxic, is not decomposed by boiling, and produces a lasting anæsthesia, thus abolishing shock and the unpleasant sequelæ of general anæsthesia. He slowly infiltrates the skin along the whole course of the proposed incision, and prepares the deeper layers. Similarly, nerves are carefully separated and infiltrated without injuring or cutting them. Complete anæsthesia is obtained in from fifteen to thirty minutes, and lasts an indefinite time. The anæsthesia is due to the infiltration of the nerves and tissues with a granular fibrin, and the anæsthetic period depends on how long it takes the fibrin to be absorbed.

Wilson² uses a strong solution of the same drug for destroying thyroid tissue in cases of **Hyperthyroidism**. Care is necessary in its use. A preliminary treatment is carried out with sterile saline solution and water to prevent excessive reaction. Into the most prominent part of the thyroid he gives from two to four injections of sterile saline, followed by sterile water at intervals of one to three days. The quinine and urea solution is used as follows: With the patient resting in bed, the skin over the area to be infiltrated is anæsthetized with cocaine or novocain, and from 1 to 4 c.c. of 30 to 50 per cent quinine and urea hydrochloride is injected into the thyroid gland. Choosing a fresh part each time, the injection is repeated

every third day. As a rule from eight to fifteen infiltrations are required to produce marked improvement in the general symptoms and disappearance of bruit. These strong solutions of quinine and urea produce extensive inflammatory changes, with round-cell infiltration, connective-tissue proliferation, and necrosis of the thyroid cells. He has used this form of treatment in fifty cases with some success, but it will not relieve the symptoms of advanced toxic goitre when the vascular and nervous systems are permanently damaged.

REFERENCES.—¹N. Y. Med. Jour. 1915, ii, 708 ; ²Jour. Amer. Med. Assoc. 1915, ii, 1102.

SALVARSAN. (See also GONORRHOEA ; SYPHILIS.)

Salvarsan, employed intravenously, cured a case of **Balantidosis** in which emetine hydrochloride failed. The case is reported by Dutcher.¹

Neosalvarsan, in small doses intravenously, was found by Foley and Vialatte² to be very effective in **Recurrent Fever**. It was of no use when administered in oily solution intramuscularly, but intravenous injections of from $\frac{1}{2}$ to 1 cgram per kilo of patient's body weight was followed by rapid convalescence, with absence of complications and relapses. It is best to give the drug as shortly as possible before the crisis of the attack.

From an investigation on 100 consecutive cases of **Syphilis** in which neosalvarsan was given intravenously, Rolleston³ comes to the following conclusions. His patients were young men, mostly between twenty and thirty years of age. Blood-pressure records were taken with Mercer's sphygmomanometer, and the auscultatory method of reading the pressures was adopted. During the actual injection both systolic and diastolic pressures are higher than on previous readings, possibly due to excitement. The pressures may vary considerably during the infusion. The average pressure seven hours after the injection is usually lower than the previous normal values, and on the succeeding days there is a still further fall, but this may in part be due to rest in bed. The general effect of injecting neosalvarsan is to lower, and certainly not increase, blood-pressure.

The removal of arsenic from the blood has been investigated by Adler.⁴ Using Emerson's modification of Gutzeit's test, he found that arsenic rapidly disappears from the blood irrespective of size of dose. In some cases the blood was arsenic-free within twenty-four hours, and the majority showed no arsenic in from thirty-six to forty-eight hours after the injection. The longest interval in which arsenic was recovered was sixteen days. He suggests that the interval between injections should depend on the rapidity of disappearance of arsenic from the blood. If the blood is arsenic-free in twenty-four to forty-eight hours, the salvarsan can be given at intervals of three days. Controlled thus, salvarsan is well borne. Cases showing untoward symptoms (Herxheimer reaction, fever, fainting, epileptiform convulsions) show a delayed excretion of arsenic from the blood. Increased tolerance to salvarsan runs parallel to increased rapidity of excretion.

Examination of the cerebrospinal fluid twenty-four to forty-eight hours after injection of neosalvarsan failed uniformly to detect arsenic, which appears to corroborate Ehrlich's finding that the subarachnoid space is not reached by salvarsan injected into the blood-stream.

An interesting case is recorded by Woodyatt,⁵ in which a severe case of salvarsan anuria responded favourably to hypertonic salt solution and alkalies. The patient had received within eight days three doses of 0.3, 0.3, and 0.4 grams of old salvarsan. Forty-eight hours after the last dose he felt ill and was feverish. The fever increased in the next twelve hours, and he had headache and slight nausea. There was great thirst, and he drank freely, but passed only 200 c.c. of urine, dark in colour and albuminous. Afterwards there was constipation and complete anuria, but no oedema. On the ground that arsenic (like chloroform) produces changes in the tissues, cyanosis, increased acidity, and swelling, Woodyatt determined to use Fischer's solution (hypertonic sodium chloride with sodium carbonate), which gives good results in late chloroform poisoning. In animals the solution is used intravenously, but Woodyatt gave it to his patient by the bowel. Three injections each of 200 c.c. were given at 9 p.m., 11 p.m., and 7 a.m. An attempt to alkalinize the blood further by administering by the mouth lemonade neutralized with sodium bicarbonate produced nausea and vomiting. The hypertonic-salt bowel injections rapidly improved the clinical aspects of the case, and within six hours of the first injection a watery stool was passed, and a small quantity of urine. The urinary flow was rapidly established; delirium, headache, nausea, and fever disappeared. The patient eventually recovered completely, and was subsequently given three further injections of 0.4 gram salvarsan at three-weekly intervals without disturbance. The rapid improvement in a severe case of salvarsan reaction produced in a few hours by the administration of an alkaline hypertonic solution is striking, and should be further tested.

REFERENCES.—¹*Amer. Jour. Trop. Dis.* 1915, Apr. 663; ²*Bull. Soc. Méd. Exot.* 1914, No. 7; ³*Brit. Med. Jour.* 1915, ii, 281; ⁴*Boston Med. and Surg. Jour.* 1915, Aug. 281; ⁵*Jour. Amer. Med. Assoc.* 1915, i, 1811.

SANATOGEN.

Sanatogen is said to consist of about 95 per cent casein and 5 per cent sodium glycerophosphate. Street¹ has examined the relative nutritive values of sanatogen and commercial casein, which latter is about thirty times cheaper. From experiments on white rats, he concludes that there is little justification for the use of sanatogen in preference to casein. A comparative feeding of four male white rats during eleven weeks showed, if anything, a slightly greater, but insignificant, increase in weight for sanatogen over commercial casein. In a ration in which casein or sanatogen was added to a diet consisting of protein-free milk, lard, butter-fat, and corn starch, sanatogen showed no advantage in checking the failure in weight of rats.

REFERENCE.—¹*Jour. Amer. Med. Assoc.* 1914, ii, 1831.

Antistreptococcus Sera.—McLeod⁸ records some interesting experiments on rabbits, in which the value of various commercial antistreptococcic sera was tested against a virulent strain of streptococci. The protective value and the curative action of the sera used before or after infection was not very striking, and as the quantities of serum used were relatively very large, it appears probable that in clinical practice not much is to be expected from their use. As a matter of fact, McLeod found that treated normal horse serum proved slightly superior to the antistreptococcic sera, and would be much more easily obtained and preserved. He thinks that much advance is not likely to be made along the present lines of immunizing horses, and that that most likely to prove fruitful is the finding of some artificial antibody to streptococcal toxin.

REFERENCES.—¹*Bull. de l'Acad. de Méd.* 1915, No. 8, 280; ²*Ibid.* No. 19, 579; ³*Ibid.* No. 18, 500; ⁴*Ibid.* No. 26, 767; ⁵*Dublin Med. Jour.* 1915, Feb. 93; ⁶*N. Y. Med. Jour.* 1914, ii, 875; ⁷*Ibid.* 1915, ii, 901; ⁸*Lancet*, 1914, ii, 837.

SILVER, COLLOIDAL.

Simpson and Hewlett¹ have investigated the germicidal action of collosol argentum, a colloidal silver solution, on the growth of *B. typhosus* in nutrient broth. They find that it is an active germicide under these conditions, but relatively slow in action. Thus 10 c.c. of a nutrient broth containing 25 parts of collosol in 1,000,000 parts broth was inoculated with 1 drop of a twenty-four-hour broth culture of *B. typhosus*. Subcultures made at intervals of fifteen, thirty, and sixty minutes showed that it required one hour's action to inhibit growth. Somewhat similar experiments by Marshall and Killoh,² but carried out with a greater variety of organisms, indicate that the germicidal action of collosols of mercury and silver is not very striking. Undiluted collosol argentum had no bactericidal action after exposure of the germs to it for fifteen minutes, but its addition to nutrient media inhibited the growth of germs subsequently inoculated. Even here it required to be present in relatively large quantities; e.g., for *B. coli* and *B. paratyphosus*, a dilution of 1 of collosol in 17.5 was efficient, but 1-26 failed to inhibit growth.

Roe³ sums up his opinion of the clinical value of colloid silver in ophthalmic work as follows: It is the most useful preparation since the introduction of cocaine. He has used it many thousands of times, and never known it cause any irritation. It does not stain the conjunctiva even after being used for months. He used the undiluted collosol as eye drops applied frequently. In **Gonorrhœal Ophthalmia** of adults and **Purulent Ophthalmia** of infants the drops are harmless, and may safely be entrusted to patients' friends. In infected **Ulcers of the Cornea** the collosol gives better results than other forms of treatment, and in **Interstitial Keratitis** it is undoubtedly of the greatest value. In **Blepharitis** and **Dacryocystitis** he finds it valuable, and **Wounds** of the cornea, sclerotic, or conjunctiva are treated

with collosol every four hours. A similar treatment is used for preparing for operation an eye from which there may be any discharge. For Burns he uses an ointment containing 50 per cent collosol. He has not found the collosol so successful in conjunctivitis as other remedies.

REFERENCES.—¹*Lancet*, 1914, ii, 1359; ²*Brit. Med. Jour.* 1915, i, 102; ³*Ibid.* 104.

SODIUM BICARBONATE.

Kellogg¹ gives a very encouraging report of the use of sodium bicarbonate in Hay Fever. Using drachm doses thrice daily in a series of 50 cases, he found that 90 per cent experienced marked amelioration of symptoms, and 70 per cent complete relief after a few days' treatment. In the remaining 10 per cent there was some improvement. The alkali acts independently of the nature of the general or local conditions. Kellogg suggests that it has a desensitizing action on the mucous membrane, and may possibly have some influence in keeping the toxins of the pollen from becoming soluble.

REFERENCE.—¹*N. Y. Med. Jour.* 1915, ii, 393.

SODIUM CITRATE.

The use of a 2 per cent solution of sodium citrate has been advised by Lewisohn¹ when transfusing blood. The citrate is supposed to prevent clotting and facilitate the operation. Lewisohn reported twenty-two transfusions successfully carried out on eighteen patients. The blood transfused varied from 150 c.c. to 1000 c.c. Simons,² on the other hand, used citrated blood in three cases, and reports adversely. He noted shock and hæmoglobinuria, and one of his patients died.

REFERENCES.—¹*Surg. Gyn. and Obst.* 1915, xxi, 37; ²*Jour. Amer. Med. Assoc.* 1915, ii, 1339.

STRYCHNINE, COLLOIDAL. (See also FULLER'S EARTH.)

McGuigan¹ has investigated the pharmacology of a colloidal strychnine prepared by removing strychnine from solution by means of Lloyd's reagent (Lloyd's reagent consists approximately of water 17.41 per cent, silicon dioxide 55.3 per cent, aluminium oxide 9.82 per cent, ferric oxide 14.8 per cent, calcium monoxide 1.58 per cent, and an undetermined quantity of carbon dioxide). The colloidal compound investigated by McGuigan was formed by precipitating 4 grams of strychnine sulphate with 60 grams of the reagent. The final product after drying weighed 65 grams, and contained about 6.15 per cent of strychnine sulphate. Examination of its action on frogs, dogs, and cats showed that the colloidal character modifies the toxic action, which is delayed greatly owing to slower absorption. Though the onset of the toxic action is greatly delayed, there is only a very limited increase in the quantity that proves fatal.

REFERENCE.—¹*Jour. Amer. Med. Assoc.* 1914, ii, 1933.

SULPHUR.

Goubeau¹ recommends sublimed sulphur in the treatment of **Typhoid Fever**. He used it in doses of 1 gram, four or six times daily for adults. The dose is gradually reduced over the first fifteen days of convalescence. He claims that thus used sulphur produces a rapid fall in fever and improvement in the general condition. He has investigated the antiseptic properties of sulphur, and states that it is effective in bouillon culture against *B. typhosus*. It does not affect the growth of *B. coli*, and in broth cultures inoculated with both *B. typhosus* and *B. coli* the former is inhibited while the latter germ flourishes. On the other hand, colloidal sulphur inhibits the growth of both organisms.

REFERENCE.—¹*Bull. Gén. de Thér.* 1915, 331.

TAMUS COMMUNIS.

Vevey¹ claims that *Tamus communis* is a valuable anti-ecchymotic. It is used externally as a compress for **Bruises** and **Ecchymoses**. The preparation employed is the extract, which is diluted with equal parts of water and used as a compress. He suggests that the extract may contain some saponin body capable of penetrating the epithelium and producing hæmolysis. *Bryonia dioica* has a similar but weaker anti-ecchymotic action in hastening the absorption of effused blood.

REFERENCE.—¹*Bull. Gén. de Thér.* 1915, 232.

THEOCIN-SODIUM ACETATE.

Beck¹ records clinical observations on twenty-three cases in which the effects of administering acet-theocin-sodium was studied on arterial tension, urinary excretion, and functional activity of the kidneys according to the phenolsulphonaphthalein test. In general it may be said that the drug reduced blood-pressure within four or five days when administered in 4- or 5-gr. doses thrice daily, and thereafter smaller doses maintained the blood-pressure at the lower level. Subjective symptoms such as asthma, dyspnoea, headache, seem to have been lessened by the drug, and when the urine was scanty the drug produced diuresis. There seems to be some relationship between the decrease in blood-pressure and the diuresis and improvement in the general symptoms. This seems to indicate that probably the drug acts beneficially by diminishing toxic products. The functional test carried out with phenolsulphonaphthalein does not indicate any definite relationship to the lowering of blood-pressure.

REFERENCE.—¹*Ther. Gaz.* 1915, 533.

TISSUE EXTRACT. (See also BRAIN LIPOID.)

Hess¹ has prepared a tissue extract which increases the coagulability of the blood. It can be prepared either from homologous tissue, human placenta, or the fresh liver or brain of animals. The tissue obtained fresh from the slaughter-house is washed thoroughly free from blood, ground up in a machine, extracted in salt solution in the refrigerator, and then filtered. Preserved with 0.3 per cent

of trikresol it is found to be sterile and to maintain its potency for a month. In animals, experiments have shown that local application of the preparation to fresh incised wounds quickly checks bleeding, and intravenous injections reduce the clotting time of the blood by one half. In two cases of *Hæmophilia* the preparation acted very rapidly and satisfactorily when applied to the bleeding area.

REFERENCE.—¹*Jour. Amer. Med. Assoc.* 1915, i, 1395.

TUBERCULIN. (See also TUBERCULOSIS.)

Solis Cohen¹ states that the oral administration of infinitesimal doses of tuberculinum purum is followed by definite constitutional reactions, chiefly headache and malaise. He confirms Latham's observations that oral administration of tuberculin can be used therapeutically. For this purpose he uses chiefly T. R., and for convenience of dosage has had special tablets made containing 0.00001 and 0.001 mgm of T.R. respectively. From these soluble tablets it is easy to prepare solutions of any strength from 0.000001 mgm upwards. He begins as a rule with a solution of 0.000001 mgm administered in a little water to which some diluted beef-juice is added. His object is to avoid any objective or subjective toxic reaction, so that the dose is carefully raised by 0.000001 mgm at a time till the maximum of 0.00001 mgm is reached or a reaction occurs, such as fever. In the latter case the dose is reduced to that previously borne perfectly, and repeated twice before a further increase is given. Two doses at most are given weekly, so that four or five weeks are required to increase from 0.000001 to 0.00001 mgm. Thereafter no fixed plan is followed, but in suitable cases one may increase by increments of 0.000005 mgm, till in the course of five or seven weeks a dose of 0.0001 mgm is reached, when a halt should be called for several weeks. In other less robust cases it is well to increase the doses more slowly. The object is to avoid reactive disturbance as much as possible while gradually increasing the tolerance to tuberculin, which usually coincides with an improvement in both subjective and objective conditions. In nine-tenths of the cases treated the maximum dose reached has been 0.001 mgm. Further increase does not seem advisable, and in some cases it is never possible to go above 0.0001 mgm. Should any toxic reaction develop, no further advance in dose is attempted till the previous dose has been borne twice without inducing any reaction.

The treatment lasts several months, and is resumed if necessary at intervals, for several years. When recommencing after an interval he resumes with about one-third or half the last dose. He thinks that in comparatively early cases of tubercle the administration orally of tuberculin can be supervised by the general practitioner. In quite early cases of a sluggish, or at least inactive, type, tuberculin is rarely needed; but even in these cases the improvement obtained by fresh air and good food may be very slow and insufficient, or come to a standstill or even retrogress, and tuberculin may be of advantage. He

states that the best results from oral administration of tuberculin are got from certain types of chronic tuberculosis in which after the first months or years of improvement there are : (1) no definite recovery, or (2) periods of relapse or recrudescence, which may be either very slight or quite severe. He finds that if, in addition to complete rest and suitable medicinal treatment, small doses of tuberculin are used, the therapeutic response is better in these cases. It is not used as a specific or as a sole curative measure, but merely as a slight additional stimulant to the natural defensive processes.

Moss² finds that relative slight immunity against tubercle is conferred on calves by feeding them on the milk of cows vaccinated against tubercle, though no difference was detectable in agglutinin, precipitin, or complement-binding tests between the milk of vaccinated and non-vaccinated cows.

REFERENCES.—¹*Amer. Jour. Med. Sci.* 1915, i, 81; ²*Johns Hop. Hosp. Bull.* 1915, 241.

VACCINES. (See also TUBERCULIN.)

Rowlette¹ records a small series of 14 cases of **Disease of the Respiratory Tract** which, after failing to react to ordinary treatment, received vaccine therapy. The results in 10 out of the 14 were very satisfactory. This series included 4 cases of chronic nasopharyngeal catarrh, with 3 satisfactory results. Four cases of acute recurrent nasal catarrh were treated, and all recovered. Out of the 3 cases of acute recurrent general catarrh, 2 gave satisfactory results, and 1 derived no permanent good from the treatment. Two cases of chronic bronchitis failed to benefit, but an abscess of the lung gave a very satisfactory result.

Casselmann² recommends the use of vaccines sterilized with phenol bodies in preference to those sterilized by heat, which he thinks diminishes their immunizing power. For this purpose he finds 0.25 per cent trikresol solution satisfactory according to the technique described fully in his article.

Antityphoid Inoculation.—(See also TYPHOID FEVER.)—Using 5,000 millions of typhoid bacilli, killed and sterilized by heat, for the first dose, and double that quantity for the second inoculation ten days later, Hopkins³ noted very little disturbance in the inoculated. A small number of men faint immediately from nervousness. In all cases the site of injection commences to throb in two to three hours, and the temperature rises to 101° or even 104°. The fever usually lasts less than twenty-four and never more than thirty-six hours. General malaise, headache, and pains in the joints are common sequelæ. Within three hours of the inoculation there is local redness, which may spread considerably.

Lumière⁴ holds that it is possible to produce successful vaccination against typhoid fever by the administration of germs from which the exotoxins and products of metabolism have been removed. Only the endotoxins are left, and the absence of exotoxins enables the

leucocytes to ingest the bacillary bodies and produce immunity. Such a vaccine produces no appreciable reaction except a very slight degree of malaise and a fugitive rise of temperature. There is no production of agglutinins. The vaccine is useful in the case of men unable to stand the reaction of an ordinary vaccine injection.

Bourges⁵ has treated in the past two years 53 cases of typhoid fever in individuals previously inoculated. In 32 cases the diagnosis was confirmed either by bacteriological culture or by post-mortem findings. Of these 32 cases of certain typhoid fever, 27 recovered and 5 died. The number of inoculations varied from one to five. Two patients had received five inoculations against enteric fever. One of these cases was mild and the other medium severe in type; both recovered. Fourteen cases had received four inoculations. Six of them were slight, 5 medium in severity, and 3 proved fatal. Of the 6 patients who had received three inoculations, 2 suffered from a very slight attack, 4 from slight, and 2 from a medium severe attack. Two of the cases had received only one inoculation. One had a slight, the other a fatal attack. The deaths cannot wholly be ascribed to enteric, as 2 of the fatal cases showed simultaneous infection with diphtheria and bronchopneumonia, and another showed early meningeal symptoms with the presence of a staphylococcus. The general conclusion drawn by Bourges is that in most cases previous inoculation confers immunity against enteric, yet a certain number of individuals are not effectively protected, and subsequently suffer from enteric fever which may be of any degree of severity. He thinks that in the previously inoculated the course of the disease is often very irregular, and that complications are rare.

Auto-immunization.—Duncan⁶ contends that the use of the patient's own pus is in every way superior to that of vaccines grown on artificial media. In the latter case the therapeutic action is lowered, and the conditions of growth are essentially different from that of tissues, whereas the use of the filtered pus ensures that the unmodified toxins producing the disease are used. He claims that in **Respiratory Disease** wonderful results can be obtained by a very simple technique. One drachm of the sputum is mixed in a 2-oz. bottle with 1 oz. of distilled water, well shaken, and allowed to stand for twenty-four hours. The product is filtered through a Berkefeld filter, and 20 min. of the bacteria-free filtrate is injected into the loose cellular tissues over the biceps muscle. No further dose is given until the patient ceases to improve under the preceding one. In chronic cases this will often be from the third to the fifth day, although the condition of the patient should always be the guide as to the time when another dose is needed. One injection will usually cure an acute or subacute bronchitis within twenty-four hours. In desperate cases, when it is necessary to hurry medication, time may be saved by mixing 1 dr. of the sputum with powdered glass or fine sand in a mortar, then adding the water, shaking thoroughly and filtering. The same filtrate may be used for three or four doses, but the sputum and water should not be allowed to stand

for more than twenty-four hours before passing through the Birkefeld filter, as otherwise it becomes too toxic.

Iskowitz⁷ holds that **Asthma** is due to anaphylaxis, and is closely comparable to the anaphylactic shock produced in sensitized guinea-pigs by the injection of small quantities of protein. In the human asthmatic, he believes that the patient becomes sensitized to the protein contained in the mucopurulent discharges coming from the nasopharynx. These trickle down into the trachea and bronchi, and eventually, if any lesion of the lung cells is present, are absorbed and produce sensitization for these proteids. In such cases he suggests immunizing against the specific proteins. For this purpose he extracts the bronchial secretion by introducing, under cocaine anæsthesia, a special flexible bronchial catheter into one bronchus and aspirating the secretion. About 60 c.c. of secretion is collected and sterilized by heat. The sterilized secretions are then slowly boiled down on a water-bath till a thick, gelatinous, viscid mass is produced. To it is added 60 c.c. of normal saline and a 0.25 per cent solution of phenol, and then the solution is filtered. The first dose consists of the injection of 0.5 c.c. of the original solution diluted to one-tenth of the original strength. Injections are given every third day in increasing strength over a period of ten weeks. Local treatment of the nasopharynx is associated with the immunization.

Nesfield⁸ follows a somewhat similar plan in treating **Suppurations**. He takes the pus from the wound and prepares it as follows: Wipe the interior of a 1-oz. wide-mouthed bottle with tinct. iodi, and rinse it out with a 1-50 solution of carbolic acid. Treat the glass stopper similarly. Collect the pus in the bottle, and add an equal volume of 1-50 carbolic solution; put in a piece of camphor, and allow the mixture to stand for at least twenty-four hours in a cool place. The dose is 2 min. on the first day, rising by a minim each day till 17 min. are used on the sixteenth day. Thereafter, if required, 10-min. doses can be given each alternate day. The prophylactic dose is 5 min. Induration may occur at the site of injection, and the temperature may rise one to two degrees. This method of injecting sterilized pus is useful in the treatment of deep-seated abscesses, septic wounds, compound fractures, mastoid disease, osteomyelitis, septic operations, etc.

REFERENCES.—¹*Lancet*, 1915, i, 1339; ²*Jour. Amer. Med. Assoc.* 1915, i, 328; ³*Dublin Jour. Med. Sci.* 1915, ii, 81; ⁴*Bull. Gén. de Thér.* 1915, Feb. 178; ⁵*Bull. de l'Acad. de Méd.* 1915, July, 791; ⁶*Med. Rec.* 1914, ii, 408; ⁷*N. Y. Med. Jour.* 1915, ii, 951; ⁸*Ind. Med. Gaz.* 1914, 471.

RADIO-ACTIVITY AND ELECTROTHERAPEUTICS.

BY

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THE outstanding feature of x -ray work during the past year has been the number of papers dealing with the subject of the accurate *localization of foreign bodies* situated within the human body. Two points perhaps stand out pre-eminently as a result of the war and of the enormous increase in this special line of radiography. One is, that this variety of x -ray work has been taken up by large numbers of men—medical and otherwise—who have had neither experience nor training in it; the second that—perhaps as a result—innumerable methods, mostly ingenious, many interesting only on account of this ingenuity, have been published, proving that, at any rate in the individual author's experience, each is the only one worthy of consideration. On the one hand, new methods and suggestions, given up after trial years ago, have been resuscitated by beginners who have not read x -ray literature, and put forward as new; on the other hand, new methods have been evolved, which arrive at results by weird devices and instruments, the very description of which baffles comprehension.

At a time when so much radiographic work in military hospitals is being entrusted to non-medical workers, and to many medical men quite without special qualifications to undertake it, it is not out of place to draw attention to the fact that unless this work is done by qualified experts, not only is its full benefit unattained, but mistakes of all kinds, leading to disastrous results to the soldiers and disappointment to the surgeons, are of constant occurrence. A reference to many of the papers afterwards alluded to shows that this is so. Radiography can always prove the presence or absence of a metallic foreign body. If one is present, then only a medical expert can give the surgeon all the information as to its exact position in the various tissues which it is possible to get from the x -ray findings.

LOCALIZATION OF FOREIGN BODIES.

A discussion on localization, introduced by Knox¹ and taken part in by fifteen x -ray workers, instrument makers, and others, formed the subject of two meetings of the Röntgen Society. The Mackenzie Davidson method formed the basis of most of the various systems

advocated, each worker having some measuring instrument or screen of special design for arriving at results. Donnithorne's screen, the Sunic localizer, and others, are described in the *Journal*; but most of these fail in simplicity and reliability on account of their large size, and the difficulty, indeed impossibility, of bringing them in actual contact with the skin in making the observations; when this is not done, an element of error comes into the calculations, as it becomes necessary to measure the distance of the screen from the skin, and deduct this from the distance of the foreign body to the screen, before the depth of the latter in the body is arrived at. As Sir Alfred Pearce Gould says, in summing up the discussion, "We must have a simple method." This remark applies very forcibly to many of the special plans advocated.

When all is said and done, and when all these methods have been considered, it becomes evident that Mackenzie Davidson's² first and entirely original localization, is the basis from which nearly everyone starts, and it is also a fact that this still remains the most exact of all those described. It, however, takes time, and should be reserved for the more difficult cases, whilst perhaps it is in the cases of foreign bodies in the eye that its accuracy is most evident. When wounded men are coming into hospital in large numbers day by day, a shorter and more rapid method is urgently called for, and when such large foreign bodies as modern rifle and shrapnel bullets form the majority, sufficient accuracy can be obtained by quicker devices which give the operating surgeon all the information necessary for their easy removal.

A further discussion on the same subject took place at the Royal Society of Medicine, and was opened by Mackenzie Davidson,³ who gave a detailed description of his original method first published in 1898. Barclay,⁴ who adopts the screen method from below up, described a new instrument devised by himself by means of which the triangles are reproduced and the exact depth of the foreign body measured and read off. This 'locator' is absolutely accurate for all distances of the screen, and is very easy to work.

The simplest of all the time-saving modifications of the Davidson method is that suggested by Hampson.⁵ He accurately centres an *x*-ray tube below a table, diaphragms down on the shadow of the foreign body as seen on the screen, and marks on the skin the point on which the shadow lies: the foreign body therefore is situated somewhere directly under this spot in this position of the part under examination. The tube is then moved 10 cm. under the table in any direction, the amount of movement of the foreign-body shadow—marked on the screen—is measured, and the distance from the centre of the tube to the surface of the screen also. With these data known, the depth of the foreign body under the skin mark is found by mathematical calculation. Hampson has devised a small pocket scale by means of which this is read off. If further accuracy is required, or a confirmation of the screen observations, a plate is laid on the part, and two exposures are made on the same plate with the same technique

and tube displacement. The measurement of the foreign-body shift can then be ascertained from the double shadow on the developed plate.

DISTANCES OF DISPLACEMENT OF SHADOW OF FOREIGN BODY

DISTANCES OF ANTICATHODE TO SCREEN, IN CENTIMETERS.

	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31
$\frac{1}{4}$	$1\frac{9}{16}$	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{5}{16}$	$1\frac{1}{2}$	$1\frac{3}{4}$	$1\frac{1}{2}$	$1\frac{1}{4}$	$1\frac{1}{4}$	1	$\frac{40}{41}$	$\frac{39}{41}$	$\frac{38}{41}$	$\frac{37}{41}$	$\frac{36}{41}$	$\frac{35}{41}$	$\frac{34}{41}$	$\frac{33}{41}$	$\frac{32}{41}$	$\frac{31}{41}$
$\frac{1}{2}$	$3\frac{21}{32}$	$3\frac{15}{32}$	$3\frac{15}{32}$	$3\frac{13}{32}$	$3\frac{9}{32}$	$3\frac{3}{32}$	$3\frac{3}{32}$	3	$2\frac{43}{48}$	$2\frac{21}{48}$	$2\frac{24}{48}$	$2\frac{21}{48}$	$2\frac{20}{48}$	$2\frac{25}{48}$	$2\frac{22}{48}$	$2\frac{19}{48}$	$2\frac{16}{48}$	$2\frac{13}{48}$	$2\frac{10}{48}$	$2\frac{7}{48}$
$1\frac{1}{4}$	$5\frac{25}{32}$	$5\frac{20}{32}$	$5\frac{15}{32}$	$5\frac{10}{32}$	$5\frac{5}{32}$	5	$4\frac{43}{48}$	$4\frac{35}{48}$	$4\frac{30}{48}$	$4\frac{25}{48}$	$4\frac{20}{48}$	$4\frac{15}{48}$	$4\frac{10}{48}$	$4\frac{5}{48}$	4	$3\frac{40}{48}$	$3\frac{35}{48}$	$3\frac{30}{48}$	$3\frac{25}{48}$	$3\frac{20}{48}$
$1\frac{1}{2}$	$7\frac{21}{32}$	$7\frac{17}{32}$	$7\frac{13}{32}$	7	$6\frac{49}{64}$	$6\frac{39}{64}$	$6\frac{29}{64}$	$6\frac{19}{64}$	$6\frac{12}{64}$	$6\frac{5}{64}$	$5\frac{45}{64}$	$5\frac{38}{64}$	$5\frac{31}{64}$	$5\frac{24}{64}$	$5\frac{17}{64}$	$5\frac{10}{64}$	$5\frac{3}{64}$	$4\frac{43}{64}$	$4\frac{36}{64}$	$4\frac{29}{64}$
$2\frac{1}{4}$	$9\frac{9}{48}$	9	$8\frac{40}{48}$	$8\frac{31}{48}$	$8\frac{22}{48}$	$8\frac{13}{48}$	$8\frac{4}{48}$	$7\frac{44}{48}$	$7\frac{35}{48}$	$7\frac{26}{48}$	$7\frac{17}{48}$	$7\frac{8}{48}$	$6\frac{48}{48}$	$6\frac{39}{48}$	$6\frac{30}{48}$	$6\frac{21}{48}$	$6\frac{12}{48}$	$6\frac{3}{48}$	$5\frac{42}{48}$	$5\frac{34}{48}$
$2\frac{1}{2}$	$10\frac{40}{51}$	$10\frac{29}{51}$	$10\frac{19}{51}$	$10\frac{9}{51}$	$9\frac{47}{51}$	$9\frac{36}{51}$	$9\frac{26}{51}$	$9\frac{14}{51}$	$9\frac{3}{51}$	$8\frac{42}{51}$	$8\frac{32}{51}$	$8\frac{21}{51}$	$8\frac{10}{51}$	$7\frac{30}{51}$	$7\frac{19}{51}$	$7\frac{28}{51}$	$7\frac{17}{51}$	$7\frac{6}{51}$	$6\frac{46}{51}$	$6\frac{35}{51}$
$3\frac{1}{4}$	$12\frac{14}{53}$	$12\frac{1}{53}$	$11\frac{41}{53}$	$11\frac{28}{53}$	$11\frac{15}{53}$	$11\frac{2}{53}$	$10\frac{42}{53}$	$10\frac{29}{53}$	$10\frac{16}{53}$	$10\frac{3}{53}$	$9\frac{43}{53}$	$9\frac{30}{53}$	$9\frac{17}{53}$	$9\frac{4}{53}$	$8\frac{44}{53}$	$8\frac{31}{53}$	$8\frac{18}{53}$	$8\frac{5}{53}$	$7\frac{35}{53}$	$7\frac{22}{53}$
$3\frac{1}{2}$	$13\frac{15}{55}$	$13\frac{20}{55}$	$13\frac{35}{55}$	$12\frac{50}{55}$	$12\frac{35}{55}$	$12\frac{25}{55}$	12	$11\frac{40}{55}$	$11\frac{25}{55}$	$11\frac{10}{55}$	$10\frac{50}{55}$	$10\frac{35}{55}$	$10\frac{20}{55}$	$10\frac{5}{55}$	$9\frac{45}{55}$	$9\frac{30}{55}$	$9\frac{15}{55}$	9	$8\frac{40}{55}$	$8\frac{25}{55}$
$4\frac{1}{4}$	$14\frac{22}{57}$	$14\frac{25}{57}$	$14\frac{28}{57}$	$14\frac{1}{57}$	$13\frac{54}{57}$	$13\frac{24}{57}$	$13\frac{7}{57}$	$12\frac{57}{57}$	$12\frac{30}{57}$	$12\frac{13}{57}$	$11\frac{53}{57}$	$11\frac{36}{57}$	$11\frac{19}{57}$	$11\frac{2}{57}$	$10\frac{44}{57}$	$10\frac{25}{57}$	$10\frac{6}{57}$	$9\frac{48}{57}$	$9\frac{31}{57}$	$9\frac{14}{57}$
$4\frac{1}{2}$	$15\frac{6}{59}$	$15\frac{16}{59}$	$15\frac{27}{59}$	$15\frac{38}{59}$	$14\frac{48}{59}$	$14\frac{29}{59}$	$14\frac{10}{59}$	$13\frac{50}{59}$	$13\frac{31}{59}$	$13\frac{12}{59}$	$12\frac{52}{59}$	$12\frac{33}{59}$	$12\frac{14}{59}$	$11\frac{54}{59}$	$11\frac{35}{59}$	$11\frac{16}{59}$	$10\frac{56}{59}$	$10\frac{37}{59}$	$10\frac{18}{59}$	$9\frac{58}{59}$

CHART TO SHOW VARIOUS DEPTHS OF A FOREIGN BODY.
FOR A TUBE DISPLACEMENT OF 10 CENTIMETERS.

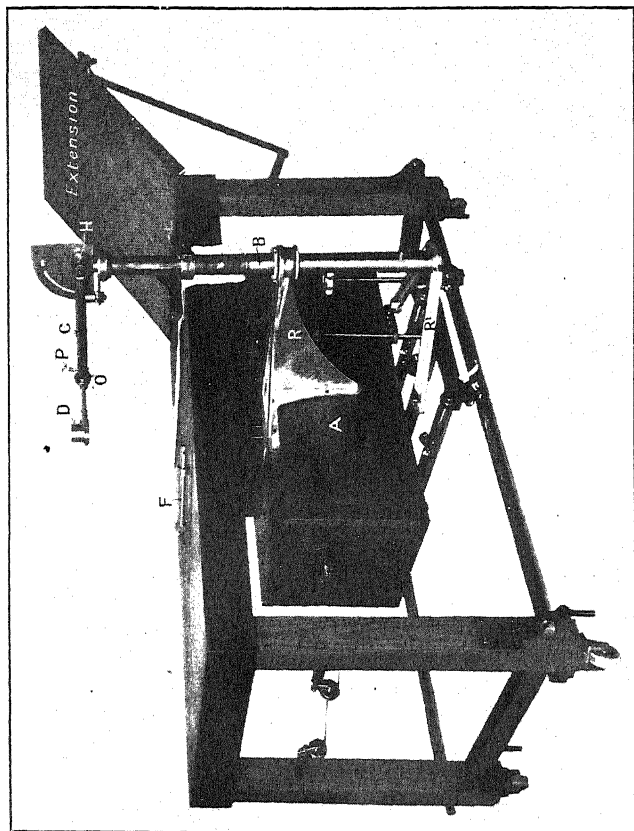
Thurstan Holland

FRACTION TO BE ADDED OR SUBTRACTED FOR EACH CENTIMETER OF DISTANCE MORE OR LESS.

Fig. 1.

Thurstan Holland⁶ has adopted this method, using an Ironside Bruce table, and has fitted to it a simple device for automatically making the tube shift, and, as suggested by Oram,⁷ a quick and

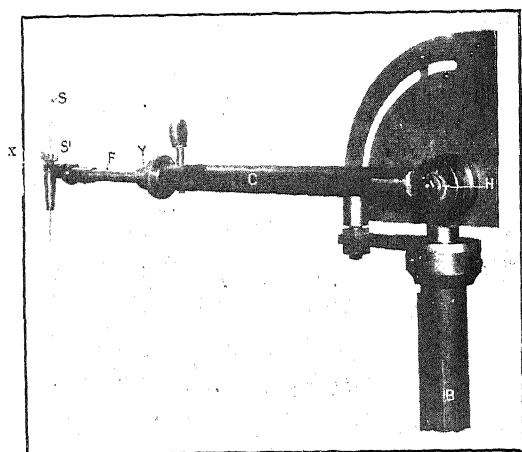
IRONSIDE BRUCE'S JOINT X-RAY AND OPERATING COUCH.



Shows the construction of the couch and operating table, an extension in the form of a flap attached to one end allowing for the accommodation of the patient in leather with the lower limbs. The couch is provided with a wooden top which may be kept clean and will not absorb fluids. The box containing the x-ray tube is marked A, and springing from it, supported by the rigid brackets marked P R', is the upright marked B, to which is attached the cross-arm marked C. All these parts are firmly fixed one to the other, and the box, with its attachments, upright, and cross-arm, can be moved freely and easily along and across the whole length and breadth of the couch. The small circular fluorescent screen attached to the cross-arm is seen in the position marked D. There is a sliding joint marked E provided (in the upright) for lowering and raising the screen so that it can be brought close to the surface of the body. On the couch is seen lying a strap for securing the subject and the sterilizable director and guide F.

PLATE II.

IRNSIDE BRUCE'S JOINT 'X-RAY AND OPERATING COUCH



Illustrates the cross-arm C attached to the upright B, showing the sterilized guide F and sharp director S attached. The cross-arm C can be raised by movement permissible at the joint H, which is constructed so that the arm is returnable into exactly the same position without difficulty. From the point X to Y the arm is sterile when in use by the surgeon.

shadow to be read off at once, and—which is of great importance—always allows of the screen being actually in contact with the skin when the observations are being made. [A year's experience of this method with the use of these devices has proved its accuracy. Within two minutes from finding that a foreign body is actually present, it is possible to mark the spot under which it lies, and to tell its depth, and this in any possible position in the human body.—C. T. H.]

Ironside Bruce,⁸ also adopting these principles, has invented, with Lindsay Locke, an *x*-ray table of remarkable ingenuity and accuracy. This table is a joint *x*-ray and operating-couch. The screen observations and skin marking are made, then the screen can be swung out of the way, a sharp or blunt needle swings into position, and this can be pushed down through the parts into the foreign body. It is left in position, the rest of the apparatus removed from the field, and the surgeon has only to cut down on the point of the director to find the

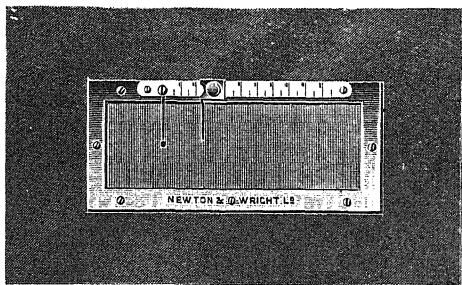


Fig. 3.—This appliance consists of a small fluorescent screen (6 in. × 2 in.) mounted in a surrounding frame of protective rubber, and covered with lead glass.

A small hole (•) is drilled through the screen and glass, which enables a mark to be made upon the patient's skin to indicate the exact position of the vertical ray. A pair of pointers sliding over a divided rule serve to locate the position of the two shadows, and the depth of the foreign body can at once be ascertained by reference to a special chart.

bullet immediately. If any hitch should arise, it is possible to replace the whole *x*-ray part of the apparatus at once, and re-confirm the direction (*Plates I, II*).

[We look upon this apparatus of Bruce's as the most exact as yet evolved, and it is a marvellous bit of mechanism. The only objections to its universal use would be the cost, and the necessity of a radiographer being present at each operation, unless the surgeon had made himself a competent *x*-ray observer.—C. T. H.]

Hernaman-Johnson⁹ advocates in several papers a 'ring localizer.' The instrument he uses is a metal ring fixed to the end of a flat wooden handle. Screening from below up, the ring is slipped beneath the screen, and the bullet shadow centred in the middle of the metallic ring. An automatic skin marker inks the skin over the shadow. He then slips the ring below the part under examination and marks the skin on the other side. The bullet lies on the line

joining the two marks through the part. If a limb, he then rotates it, and repeats the marks at right-angles. The depth of the foreign body is calculated, if required, by the triangulation method already referred to. [It must be remembered, when a limb is rotated in this manner, that if a bullet is situated in the flesh it very often, owing to the different pressure on the flesh, appears to alter its position and depth. For example, take a bullet in the muscles of the thigh. Measure the depth with the patient lying on his face and the screen or plate on the back of the thigh; the depth comes out at, say, 5 cm. under a marked spot. Turn the limb on its outer side, at right angles to the former position, and a radiograph shows on the plate that the depth from the skin edge may be 7 cm. This is a point often overlooked by surgeons and radiographers.—C. T. H.]

Blake¹⁰ makes a double exposure on one plate after placing on it two small metal cylinders embedded in wax with a height-finding needle between them, and after placing on the skin a wire triangle. The shadows (double) of all these appear on the plate, in addition to the double shadow of the foreign body. Either on the plate, or on a print, a large number of lines are drawn joining various parts of the diagram together, and when this has been done and a certain number of distances measured, it is possible by formulæ to work out the depth and position of the foreign body.

Jordan¹¹ advocates the use of the method of parallax. This is based on the fact that all objects at the same depth below the screen will appear to move at the same pace when the tube is moved. He has designed a pair of uprights with a clamp to hold the screen. On either side are two metal pointers, movable, to place on each side of the limb. These pointers are moved up or down until they are found to be in such a position that on moving the tube the shadow of the foreign body still remains on the line joining the ends. A scale on the uprights holding the pointers then indicates the depth of the foreign body. The originator of this idea is Shenton,¹² who described it eight years ago.

Few writers have suggested the use of stereoscopic radiography in connection with this subject, but a reference to its great value in many cases is to be found in Mackenzie Davidson's¹³ paper, and also a short description of the technique. Other papers of value have been published by Clarke,¹⁴ Mowat,¹⁵ Lindsay,¹⁶ Cherrill,¹⁷ and de Courmelles.¹⁸

A discussion by medical officers¹⁹ engaged in this work in France is of value in showing the practicability of some of the suggestions when applied to conditions at the front. The methods in vogue in France are described by Charlier²⁰ in an exhaustive paper, and it is not without interest to note that many of the French radiologists have arrived at, and use, similar methods to those of British workers, these being known in France under the name of the French expert, whilst in Britain the Briton gets the credit.

Shaxby²¹ has invented a method which he claims abolishes measure-

PLATE III.

SKIAGRAM TO SHOW A RIFLE BULLET IN THE HEART



PLATE IV.

[SKIAGRAM TO SHOW A RIFLE BULLET IN THE BRAIN



ments and calculations. He uses a miniature ladder of metal with lead wire rungs, parallel and equidistant, but oblique. A double-plate exposure is made with this ladder set up with its plane perpendicular to the plate. The distance of movement of the foreign body is measured with calipers, and a corresponding distance found on the shadows of the rungs of the ladder. Then, as the rungs are 1 cm. apart on the ladder, the depth of the object is easily arrived at. This necessitates the use of a plate in all cases, and in this respect differs from, and takes more time than, those already alluded to. A fine wire cross is placed on the skin before the plate is taken, and the calculations of position of the foreign body are made from this. This wire is better placed exactly on the foreign body by one of the usual screen methods, but this is not essential.

Caldwell,²² in a valuable paper, points out that after all is said and done, however accurate the localization may be, whatever method is used, when it comes to the actual extraction, failure to find the foreign body is always a possible termination to the operation. He lays down the principle that in war work the operating table and the *x*-ray table should be one, and that the operating theatre and the *x*-ray room should be combined. This necessitates a dark room; and he advocates the use of an automobile headlight above the table for lighting the field of operation, whilst the anæsthetist uses a pocket-lamp with a blue glass. The operation is done on the *x*-ray table, and is controlled by means of *x*-ray observations at the time, a preliminary *x*-ray examination having been already made for the purpose of rough localization. His paper gives all the details of his procedure, the arrangement of the tube, screen, etc., and the methods of asepsis. An experience of 350 cases dealt with in this manner has proved its value.

Bland-Sutton²³ deals with the more general subject of the value of radiography in the diagnosis of bullet wounds, and illustrates his paper with typical radiographs of bullets and other metallic bodies. This communication is of value as being written more from the surgeon's point of view, and pointing out his requirements. Both this and Caldwell's papers show very forcibly that the *x*-ray work should be either done or supervised by a qualified medical man expert in this branch of his work.

It is well known that bullets may pass through important structures and do little injury, and even lodge in important organs without causing marked—or even any—symptoms. Finzi²⁴ relates a case of a rifle bullet *in the heart*, and publishes radiographs. This man, after being wounded, walked a mile and a half to the dressing station. The bullet was in, or attached to, the muscular wall of the right ventricle. *Plate III* is a radiograph of another case of this kind, the screen examination and plates showing that the bullet was definitely in the heart. Many cases have occurred in which the bullet has *traversed the brain*. *Plate IV* is an illustration of such a case. The entry wound was in the centre of the top of the head, and a hole in the skull

could be felt ; the bullet is lying inside the base of the skull. Several weeks after the injury this man was perfectly normal with the exception of occasional headache.

Cotton's²⁵ papers dealing with the principles of *x*-ray localization and with the radiographic centroscope and episcopes are well worthy of study by those interested in this subject. Various fallacies in the ordinary readings and interpretation of *x*-ray negatives and prints, with special reference to their bearing on the position of foreign bodies, are discussed. The author is at pains to point out that "the method of perspective" has been almost entirely neglected and misunderstood owing to an initial and almost universally prevailing error in viewing the *x*-ray picture—the print usually—from the wrong side. The explanation of this error is found in his diagrams of shadows, and incidentally it is shown that the fluoroscopic shadow is always, and of necessity, viewed from the wrong side. In a further paper the same author describes his method of localization, and the apparatus he has devised.

Closely allied to the use of *x* rays in the removal of foreign bodies is the employment of the *telephone probe*. Mackenzie Davidson²⁶ publishes an historical article on this subject, showing that he used it as long ago as 1887, and later, in conjunction with *x* rays, at the time of the South African War. In this article the physics, surgical procedure, and utility are all described. The author has lately designed a probe of great simplicity, with a double ear attachment, a hose connection which can be sterilized, and an attachment that enables the surgeon to fix it immediately to any instrument he is using. A useful point to remember is that this telephone can be fixed to a needle, and that before operating the needle can be run down on to the foreign body ; the characteristic sound is heard on contact of the needle, which can then be left in position as a guide before any incision is made. A further description of such a piece of apparatus is published by Aldridge,²⁷ but this differs from that suggested by Davidson, inasmuch as he uses a dry cell in the circuit, whilst Davidson employs merely a carbon plate.

Bergonié²⁸ has suggested another means of assistance in the use of the *electro-magnet*. His procedure is to pass the extremity of the core of the magnet backwards and forwards over the suspected part, not allowing it to come into actual contact with the skin. If, on superficial palpation, any vibration of the tissues is found, it indicates that there is an embedded body which is magnetizable. The point of maximum vibration on deeper palpation indicates the nearest position of this body. After making the incision the magnet is again used, and the surgeon follows with his finger the direction in which the vibration continues. This method is not put forward as a substitute for *x* rays, but as an additional means of localization. A further communication bearing on this method is published by Monks,²⁹ who suggests its use in finding needles. The buried needle is magnetized by passing a magnet over the suspected locality. An examining

needle, suspended from a fine silk thread, is then slowly passed over the same locality. Then one end or the other of the suspended needle will be attracted by the buried, magnetized needle, and will dip in its direction. Another paper by the same author³⁰ deals with the literature of this subject, and five cases are described in which the method was used. Illustrations show the exact technique. In cases in which the needle fragment is small and fine—when the magnetic charge will not be retained—and in which the needle is deeply situated, the method is probably of no use, but the author thinks that in some cases it is of distinct assistance.

REFERENCES.—¹*Jour. Röntgen Soc.* 1915, 6; ²*Brit. Med. Jour.* 1915, i, 1; ³*Proc. Roy. Soc. Med. Electrother. Sect.* 1914, 1; ⁴*Ibid.* 1915, 19; ⁵*Arch. Rad. and Elect.* 1914, ii, 203; ⁶*Ibid.* 272, and 1915, i, 307; *Proc. Roy. Soc. Med., Electrother. Sect.* 1915, 23; ⁷*Proc. Roy. Soc. Med., Electrother. Sect.* 1915, 26; ⁸*Arch. Rad. and Elect.* 1915, ii, 34, *Lancet*, 1915, i, 275; ⁹*Brit. Med. Jour.* 1914, ii, 752; *Ibid.* 1915, i, 5; *Arch. Rad. and Elect.* 1914, ii, 247; ¹⁰*Arch. Rad. and Elect.* 1915, ii, 69; ¹¹*Jour. Röntgen Soc.* 1915, 17; ¹²*Arch. Röntgen Ray*, 1899, 18; ¹³*Brit. Med. Jour.* 1915, i, 1; ¹⁴*Arch. Rad. and Elect.* 1915, i, 73; ¹⁵*Brit. Med. Jour.* 1915, i, 112; ¹⁶*Ibid.* 631; ¹⁷*Arch. Rad. and Elect.* 1915, ii, 97; ¹⁸*Ibid.* 89; ¹⁹*Brit. Med. Jour.* 1915, i, 641; ²⁰*Jour. de Rad. et d'Elect.* 1915, 577; ²¹*Brit. Med. Jour.* 1915, i, 11; ²²*Ibid.* ii, 322; ²³*Ibid.* 1914, ii, 953; ²⁴*Jour. Röntgen Soc.* 1915, 90; ²⁵*Pract.* 1915, i, 513; *Bristol Med. Chir. Jour.* 1914, 202; *Brit. Med. Jour.* 1915, i, 464; ²⁶*Lancet*, 1915, i, 217; ²⁷*Brit. Med. Jour.* 1915, i, 70; ²⁸*Arch. d'Elect. et Méd.* 1915, No. 390; *Brit. Med. Jour.* 1915, i, 979; ²⁹*Boston Med. and Surg. Jour.* 1915, i, 285; ³⁰*Ibid.* ii, 37.

NEW APPARATUS.

The new hydrogen *x*-ray tube¹ seems to be a distinct advance in tube-making, and promises many advantages. In principle the improvement is that a small glass bulb is blown in the wall of the *x*-ray tube and filled with chemically pure hydrogen. An ingenious use of osmosis allows of exact regulation of the vacuum either up or down, and the stability of the vacuum is remarkable, and due to the fact that the hydrogen does not form chemical combinations of gases inside the tube in the manner that oxygen does. The bulb does not heat readily, and the rays produced are of high penetration. The regulation is so much under control, and so easy, that this tube can be used for all kinds of work requiring totally different tube conditions successively. Snook and Kelly—the inventors—give a full description of this tube, and explain in detail its use, and the methods of regulation.

REFERENCE.—¹*Arch. Röntgen Ray*, 1915, i, 372.

X-RAY DIAGNOSIS.

A committee of the Electrotherapeutic Section of the Royal Society of Medicine, whose recommendations were confirmed at a meeting of the Section,¹ has suggested a *standard opaque meal for the radiographic examination of the alimentary canal*. The chief points are that this meal should be of either bread and milk or of porridge, that the bulk should be about half a pint, that it should contain 2 oz. of barium sul-

phate or the same amount of bismuth oxychloride, should be taken on an empty stomach, and that no aperient should be given within thirty-six hours of the first examination. Further details as to the exact preparation of the meal, etc., are to be found embodied in the report. Crane² claims American priority for the use of bismuth in the *x*-ray examination of the stomach. He points out that this credit has been almost universally given to Reider, of Munich; but that literature shows that Williams, of Boston, assisted by Cannon, gave bismuth to a boy, and made tracings of the stomach, five years before Reider's publication, and that this and other cases were published in Williams's book on "The Roentgen Rays in Medicine and Surgery," in 1901; whilst Leonard demonstrated a case of gastropotosis by the same means in 1897. The author of this paper remarks that, as far as he is aware, no mention of this work of Williams is to be found in the writings of any German author, although the volume in which it appeared is duly listed in their reference books.

Œsophagus.—Stewart³ recommends the introduction either instrumentally or by swallowing, of a section of 'hog casing' 16 in. in length, and the subsequent administration of bismuth mixed with cream of wheat. This bismuth-filled tube, adapting itself to the form of the œsophagus, gives an accurate reproduction of the organ, and the radiographs which illustrate the paper are very beautiful. It is claimed that the differentiation between diverticulum and carcinoma is more certain, and that generally the position and details of a lesion are more clearly demonstrated. Aubourg and Belot⁴ publish a very complete paper on the technique they adopt in œsophageal examinations, and illustrate it with typical examples of all the varieties of obstruction and other lesions which occur.

Stomach and Duodenum.—Walsham and Overend⁵ discuss the movements of the normal stomach, pointing out that the organ *in vivo* and active is an object very different from the same organ as seen at operation and in the dissecting-room. In this paper the radiological divisions are explained, and the innervation; then, after a reference to the technique and a description of the movements, the action of the vagi and splanchnics, the gastric reflexes, the rôle of the acid secretions, and the duodenal reflexes all come under review. Jefferson⁶ examined twenty-four normal adult stomachs from the point of view of the passage of fluid through the body of the organ. He claims that the inner or oblique muscle stratum is arranged in a very significant manner: that it forms an inverted U over the stomach, produces the incisura cardiaca, and by its contraction forms a physiological canal along the lesser curvature. Accepting this, then the passage of food down the stomach along the lesser curvature—as seen by radiography—is explained. This would also explain the mechanism which enables the vomiting of bile from a stomach which is known at the same time to contain food.

George and Greber,⁷ after showing that all the usual diagnostic methods fail in the diagnosis of early and operable Carcinoma of the

stomach, and that the same may be said of most of the accepted *x*-ray signs, claim that with proper technique it is possible in many cases to come to a definite diagnosis in a very early stage from an *x*-ray examination alone. They are of opinion that the fluorescent screen is quite unreliable for these cases, that plates must be taken on two occasions at least, and that these must show a characteristic defect, annular in character, which resembles a great elongation of the pyloric gap. It is of special importance to show this defect in a lateral view. To quote their words, "The lesions are small and located near the pylorus, showing small filling defects, annular in character." A further communication⁸ from the same authorities is found in a paper which is based on their findings in 1000 gastro-intestinal cases. In summing up their results they state that with their method of examination they are of opinion that they are warranted in making either a positive or negative diagnosis in regard to the presence or otherwise of organic disease of the gastro-intestinal tract which requires surgical interference, with the possible exception of gall-stones. Again they insist that plates must always be taken, and that no reliance can be placed upon the fluoroscopic findings alone.

A long and complete paper is communicated by Holding⁹ on the "*X-ray Method of Differentiating between Ulcer and Cancer of the Stomach and Duodenum.*" This is profusely illustrated. He lays stress on one point, often overlooked by physicians, surgeons, and radiologists, which summed up may be expressed as follows: "A scientific diagnostician will not diagnose gastric lesions on Röntgen-ray examinations alone, nor should he diagnose important gastric lesions without using the Röntgen rays." The *x*-ray diagnosis of **Duodenal Ulcer** has long been a matter of contention amongst radiologists, and innumerable papers appear every year as to the possibilities and otherwise of arriving at a correct decision. Cole¹⁰ has written profusely on this subject year by year. He is a strong advocate of the serial plate method, and claims absolute success in thirty-three cases, in which the severity of the symptoms brought about an operation notwithstanding a decided negative *x*-ray opinion; in not a single instance was anything found surgically in the stomach or duodenal cap. On the other hand, Barclay,¹¹ criticizing Cole's papers and dogmatic statements, points out that inasmuch as Cole says, "that the duodenal ulcers that consist merely of a mucous-membrane erosion will not show any *x*-ray abnormality, that these are a negligible proportion of the cases and are of no surgical importance," this shows that the writer fails to grasp the fact that danger from a duodenal ulcer does not lie in the deformity it produces, but in its erosive qualities. Bleeding from one of these small and superficial ulcers may be serious, and if, as Cole admits, no *x*-ray evidence can be obtained of them from a set of serial radiographs, then his contention to be always successful in the *x*-ray diagnosis of duodenal ulcer falls to the ground. Brewer and Cole¹² return to the same subject,

having perfected a machine which will give 50 röntgenograms of a single stomach cycle, or 200 of the progression of an individual peristaltic contraction from the fundus to the pylorus. There is no doubt that the illustrations shown in this paper, which are exceedingly good radiographically, taken with the clinical and radiographic diagnoses, and compared with the operative findings, are valuable evidence of the strength of their case. They show clearly that, at any rate in many cases, the negative *x*-ray findings are quite reliable, these having been confirmed by the operation.

The Colon.—Gompertz and Scott,¹³ experimenting in cases of **Chronic Constipation**, conclude that the variations in the rates of passage of the meal along the intestine are small and not constant, whether a preliminary aperient has been given or not. Sometimes there was greater rapidity, sometimes less, and in the same patient there was variation in the times when several different tests were made. The practical result of their investigations appears to be that, whilst it is better to clear the bowel, nevertheless in cases where time does not permit of this being done, the conclusions reached are not vitiated by the omission.

Case's¹⁴ paper on the *x*-ray investigation of the colon is worthy of special study. The whole ground is covered, and the author's experience compared with the findings and conclusions of other writers. In carcinoma of the colon the examination should begin with a barium enema, and this should be followed by an ordinary barium meal. Stereoscopic radiography is strongly advocated as giving far more information than the fluoroscope or the single plate. Two points should always be borne in mind. One is, that two separate examinations must be made in order to verify the findings; the second, that the investigation of one portion of the alimentary tract is incomplete without a careful study of the entire digestive system. The various segments of the alimentary canal present such an intimate interrelation governed by reflexes, that conclusions, especially where operation follows, should be expressed only after a complete study of the whole.

Carman,¹⁵ of the Mayo clinic, reports a case of **Diverticulitis of the Sigmoid**, and three cases of the same condition of the large bowel. Like all papers from this clinic, this report is complete in all particulars. Not content with actual *x*-ray findings in a living case, the author has studied pathological specimens, and has shown that whilst in some cases *x*-ray evidence of these diverticula can be demonstrated, in many cases the possibilities of *x*-ray demonstration are quite hopeless. Case¹⁶ shows some really beautiful radiographs of the same condition; two of these, taken fifty hours after the meal, demonstrate multiple diverticula of the colon when the rest of the meal has passed. Again stereoscopic work proves invaluable, and, as a rule, the demonstrations are better by the barium meal than by the enema. Other instructive papers on colon *x*-ray work are those of Quimby¹⁷ on the interpretation of intestinal conditions, and on chronic intestinal stasis; and

fluoroscopic and *x*-ray diagnosis in the light of operative findings, by Bainbridge.¹⁸ *Pericolic membranes* form the subject of a paper by Skinner.¹⁹ This, again, is new *x*-ray work, and the illustrations and notes on the cases show the possibilities of radiography in this direction. Fluoroscopic palpation in both the horizontal and vertical positions is essential in making this diagnosis. Filling errors and constrictions of the food shadow are the essential *x*-ray conditions for conclusions.

The Appendix.—Hertz²⁰ points out that chronic appendicitis often gives rise to dyspepsia, and that the correct diagnosis of such cases is full of difficulty. He is of opinion that *x* rays can furnish evidence which is convincing in a large majority of such cases. The barium-filled appendix can be seen in greater frequency than is generally known if proper means are taken to look for it, and the examination should be made between six and twenty-four hours after the meal, care being taken to use a small diaphragm and palpate the ileum and cæcum out of the way. The appendix can be seen in at least 50 per cent of normal individuals, and with equal frequency in chronic appendicitis. The important point to remember is that, when it is thus seen, it can be demonstrated beyond doubt that in palpating for the tender spot it is actually the appendix which is the site of the tenderness. Without this ocular demonstration, doubt must of necessity be present. Incidentally, abnormality of shape and size, and the presence of kinks and adhesions, are demonstrable. Hertz depends on the screen examination and drawings for his results; this is to a certain extent unsatisfactory, and the actual plate appearances are more convincing, as a study of Imboden's²¹ paper, well illustrated, clearly shows. He advocates the Trendelenburg position for the *x*-ray study of this organ, and suggests that retention of appendical contents after the cæcum is empty should always be regarded as suggestive of chronic appendicitis, especially when associated with a tender appendix.

Still another disease is to be attributed to the effects of chronic intestinal stasis, and Jordan²² advances the view that in *glycosuria* we usually have to deal with patients the subject of this condition. He draws the conclusion that the stasis is the cause of the glycosuria. In support of this theory he describes fully the *x*-ray findings in two cases—a male and a female, both adults—in whom stasis was demonstrated by the barium meal, and who both died from diabetic coma within a few days of having taken the meal. If it is accepted that gall-stones, duodenal ulcer, chronic pancreatitis, mastitis, etc., are the direct results of stasis, then the addition of glycosuria to the list may be made without great strain on one's credulity.

Gall-stones.—Cole and George²³ publish a comprehensive paper dealing with this subject, and giving the history of the development of radiography in connection with it. Repeated examinations are necessary; but if, as is suggested, this must include a careful study of from fifteen to twenty *x*-ray plates, and then, if no evidence of calculi

is found, examination of the stomach, duodenum, and colon, then the practical everyday use of x rays for these cases is outside the area of practical politics, at any rate as far as this country is concerned. The authors are of opinion that the Coolidge tube, with its possibilities of accuracy, has rendered the diagnosis of this condition more possible. They even go so far as to suggest that the negative diagnosis has become of importance. [This contention cannot be accepted at the present time.—C. T. H.] Cole's²⁴ paper on the detection of pure cholesterol gall-stones by x rays, in which he endeavours to maintain the position that these stones may be shown as a 'negative' shadow, is still less convincing. The conclusions advanced in this paper, based as they are on experimental work outside the human body, seem to prove that the x -ray examination from a negative point of view must of necessity be, to say the least of it, doubtful. At the same time, this work of Cole's is well worthy of consideration. Pfahler²⁵ suggests a new position for the demonstration of these stones, one which he claims to be of importance, inasmuch as it throws the shadow of any gall-stone outside that of the kidney. For this the patient is placed obliquely upon his right side, whilst the compressor is directed into the epigastric region and tilted so that the centre of the cylinder is resting posterior to the right costal border; the angle must be varied according to the thickness of the patient. This is only one of a series of plates taken in different directions. The author lays great stress upon the examination of the plates and the lighting to be used for this.

Larynx and Trachea.—Iglauer²⁶ points out that x rays are of particular value in the study of the normal ossification of the laryngeal cartilages, and goes on to compare these normal shadows with the changes brought about by disease. It is claimed that the peculiar hazy, indistinct outline of the cartilages shown by radiography in tuberculous disease is quite characteristic. Carcinoma of the larynx can possibly be shown. In stenosis or distortion of the lumen of the larynx or the trachea, x rays usually reveal the seat, nature, and extent of the lesion, and are thus of value before operation.

Lungs.—Walsham and Overend²⁷ discuss the causation of Williams's sign in early pulmonary phthisis with special reference to nerve supply. They are of opinion that limitation of diaphragm movement, etc., is due to a reduction in the duration and amplitude of the inspiratory wave, with a definite measure of protection and rest for the diseased areas of the lung. There is also a second paper²⁸ on the same subject by the same authors written on similar lines. A third paper²⁹ deals with the radiological types of pulmonary tuberculosis, well illustrated with typical examples. This is a preliminary communication, to be followed by a more complete one. All these articles are a valuable addition to our knowledge as to the early recognition of this disease. Bissell and Richards³⁰ deal with the early diagnosis in a paper the conclusions of which are based on the study of 219 cases, the majority of which presented indefinite signs. In their opinion the profession

must be taught not to depend upon physical signs, either for a positive or a negative diagnosis of early pulmonary tuberculosis. A negative Röntgen diagnosis is as valuable as, and perhaps more conclusive than, a positive. A further interesting conclusion they have come to is that hilus tuberculosis is usually secondary to a focus in the lung. The treatment of **Pulmonary Tuberculosis** by nitrogen compression is dealt with by Lucas,³¹ and a series of radiographs illustrating this paper are of great interest. Melville³² calls attention in a note to a new sign in the *x*-ray diagnosis of pulmonary tuberculosis. In the normal lung during full inspiration the expansion of the apices is equal, and it is possible to see, above the clavicle, the posterior ends of at least the two upper ribs; also the two upper intercostal spaces are of equal width. In lessened expansion—due to tubercle—not only is a smaller area of the bony framework visible, but the space between the first and second ribs becomes obliterated. He emphasizes the necessity, in screening, that the central *x* ray should be accurately placed at the level of the third costal cartilage with the sternum.

Nasal Accessory Sinuses.—Berry³³ has invented a special chair for fixing the head, and has worked out—chiefly from the dead specimen—the exact angles which show the various sinuses best. This paper is illustrated by numerous radiograms of skulls and explanatory diagrams, and is a very valuable addition both to correct taking and interpretation. Waters³⁴ and Waters and Waldron³⁵ advocate a slight modification of the occipito-frontal position, and give radiograms, which on one plate show the frontal and maxillary sinuses and the anterior and posterior ethmoid cells. The technique is interesting and simple. The three essential points for success are: (1) The chin should always touch the plate; (2) The long axis of the tube should be parallel to the plate; (3) The nose of the patient should be from 1 to 1.5 cm. from the plate, and under no conditions should it ever rest upon it. They recommend soft tubes and intensifying screens with long exposure—as much as twenty-five seconds. Finzi and Hett³⁶ have investigated the radiography of the maxillary antrum, and believe that the best way of placing the head in the best position is by a preliminary screen examination. They have also experimented with the skull by filling the antrum with bismuth, and taking radiographs of it in various positions and from different angles. One result of their investigations goes to show that it is possible to get good pictures of each antrum by an oblique view. Of course each must be on a separate plate. Bowen³⁷ has worked out a new method of obtaining a radiograph of the sphenoidal sinus by tilting the head over the end of a table so that the vertex rests on the plate, and then directing the rays through the neck from below the chin. It is difficult to describe the technique, but the illustrations in the paper make it quite clear. The correct reading of the plates taken in this position requires care and experience. [All these papers are very suggestive from the point of view of technique, and are well worthy of study by

radiologists interested in a somewhat difficult branch of radiography, difficult not only from the view point of obtaining good negatives, but also from that of interpretation. The text-books are very deficient as regards technique.—C. T. H.]

Lawrence³⁸ describes a new position for radiographing the *shoulder-joint* which seems to have possibilities. He claims to have solved the problem of obtaining two views of this joint at right angles to one another. The usual antero-posterior view is used, and for the second plate the patient sits or stands with the arm from his side, the plate is on the top of the shoulder, the tube is got into the axilla, and the rays are directed upwards by leaning towards the injured side. Two fine pictures of a bullet in the head of the humerus illustrate—with others—this paper, and a further point shown is that the coracoid process comes beautifully into the field.

Thurstan Holland³⁹ has been successful in showing *in situ* a small **Stone in the Salivary Gland**, and describes the technique by which this was accomplished. It is evident from this case that these stones will only be demonstrable by *x* rays in a small percentage of the cases in which they are present. Hickey⁴⁰ also describes a successful *x*-ray diagnosis of the same condition; he obtained his result by placing the patient in an unusual position (see illustration in the paper) and placing a piece of film inside the mouth. This method is very ingenious and deserves notice. Watson's⁴¹ paper on **Ureteral Stone**, although mainly surgical, is of interest to *x*-ray workers, inasmuch as, in addition to the successful demonstration by *x* rays, the anatomy of the ureter and its nerve-supply are fully described. The diagrams showing the reasons for the stones lodging in special parts are a useful guide to *x*-ray examination.

Rubin⁴² has used *x* rays with the aid of intra-uterine collargol injection for diagnostic purposes in *gynaecological* cases. The technique adopted is fully explained, the chief point being that 5 c.c. of the collargol solution are injected with a syringe into the uterus, the strength being 10 per cent. The author claims that in selected cases—there should be no active infection of the uterus or tubes—there is no danger, that the patency or otherwise of the tubes can be demonstrated, that it is useful in differentiating between intra- and extra-uterine tumours, that in certain malformations of the uterus it is of assistance, and that it aids in the study of true flexions, etc.

In *dental radiography* Hall-Edwards⁴³ describes the apparatus necessary, the use of plates and films, and the conditions of technique necessary for success. He is of opinion that dentists in this country do not appreciate the great amount of assistance which routine *x*-ray examination of teeth can afford, and points out that dentists make a mistake in supposing that it is only of service in rare instances. Great emphasis is laid on the necessity for both care and skill in the interpretation of these radiographs, and on the importance of even a negative diagnosis. For instance, it cannot be said that radiography is of no importance when, although it does not discover

the cause, it proves that at any rate a buried third molar is *not* the cause of pain or a false ankylosis. Finzi's⁴⁴ communication on the same subject, illustrated by some beautiful x -ray pictures, is a very good article, full of practical hints as to method. The oblique views, with the plate outside the mouth, are especially good. He advocates the use of small plates inside the mouth as preferable to films in many cases, and suggests painting the mouth inside with 10 per cent cocaine solution, in order to facilitate placing and keeping the plate in position. Again the necessity for skilled interpretation is insisted upon.

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X-RAY TREATMENT.

Closely connected with the advances in x -ray treatment is the Coolidge tube, and a paper by Russ¹ on the penetrating power of the rays from this tube is worthy of careful study. He deals chiefly with two points: the measurement of the hardness of the rays used for treatment, and the comparison between these and the hard gamma rays from radium. The question of filtration, and the result of different thicknesses of aluminium filters, are also discussed. An important point made is that x rays have much less penetrating power than these gamma rays, but the difference between them varies according to the nature of the filtering substance. A further contribution by the same author² deals with the measurement of the radiation from the Coolidge and other x -ray tubes. This is a highly technical paper, in which the methods of the research are explained, and tables of curves and figures show the various results arrived at. Cole³ also deals with this tube from the point of view of its therapeutic possibilities, and details his experiments and the conclusions come to. He obtained a full erythema dose (unfiltered) in thirty seconds, and the same dose through 3 mm. aluminium in one minute. He believes that this tube offers a greater hope for the successful treatment of

cancer than anything except surgery, and that post-operative radiation should be carried out as a routine.

Dodd⁴ considers that the advent of the Coolidge tube has increased the possibilities of *x-ray dermatitis*, and has seen twelve such cases within one year. In some of them the results followed plate-taking even through filters. His paper deals with the treatment of this condition and its prevention. It is suggested that bicarbonate of soda solution applied to the skin is both a preventive of dermatitis and a curative agent if it has already supervened. As intimately connected with this subject, the discussion on protection at the Röntgen Society is valuable. At this Russ⁵ gave the results of his examination of various makes of lead-rubber and lead-glass. The importance of this is evidenced by the fact that mere thickness of either is immaterial, whilst quality is all-important. One sample of lead-glass 5 mm. thick allowed 4 per cent of radiation to go through, whilst another sample 3.65 mm. thick passed only 3.4 per cent. It is obvious, therefore, that every protecting material should be tested before reliance can be placed upon it, and mere thickness must be disregarded.

Sequeira's⁶ experiments on *x-ray filters* are interesting and instructive. These experiments were undertaken with a view of the better understanding of the results of the filtration of *x* rays by aluminium filters of different thicknesses in the massive-dose treatment, and the observations are based on the effect on S pastilles controlled by Corbett's tintometer. An important observation made showed that a 1.5-pastille dose without a screen meant that the skin received a $\frac{3}{8}$ B dose, that is, a dose which would cause an erythema, whilst a 10-pastille dose through 4 mm. of aluminium meant that the skin dose was $\frac{1}{8}$ B, and nevertheless no erythema followed, only pigmentation, and these doses could be repeated at short intervals with nothing more than an increase in the pigmentation. Two large sarcomatous masses disappeared following 70 B doses given in seven doses bi-weekly with no skin effect beyond this pigmentation. Pfahler⁷ has also carried out a series of experiments on the same line and for the same purpose. These experiments were made with a Coolidge tube, and the actual effects at different depths were estimated, definite thicknesses of steak being employed, and Kienbock's photographic paper placed under the various meat layers being used as the testing material. Amongst other conclusions it seems that to obtain the equivalent of an erythema dose at a depth of 3 in. through an aluminium filter 3 mm. in thickness, it was necessary to cross-fire on the deep point fifty times.

Stern's⁸ paper, in which he discusses various methods and technique used by different workers, is of value as showing what can be done by large filtration in the administration of massive doses in **Deep-seated Malignant Disease**. He points out the great difficulty there is in accurately measuring these filtered *x* rays from very hard tubes. Two further papers by Pfahler⁹ on the treatment of deep-seated

malignant disease and the treatment of recurrences and metastases from carcinoma of the breast are very complete, and the illustrations and detailed accounts of the results are amongst the best recorded. There is much to be learnt from both these papers as to technique and management. Pfahler is a strong advocate of operation in the first place, and of post-operative x -ray treatment in all malignant cases. He points out that it is possible now to give hundreds of times more x rays to the deeper tissues than could be given in the days of fractional doses. He uses thyroid extract in conjunction with x rays, and with the experience of 150 cases thus treated believes that his results have markedly improved. Codd¹⁰ writes on the same subject, and especially emphasizes the importance of post-operative prophylactic treatment being undertaken early. Delay in radiation in cases of recurrence is as dangerous as delay in operation in primary cases. He discusses the advantages of x rays over radium for the general treatment of malignant disease, pointing out that whilst radium has penetration and very little quantity (that is, of course, in the small amounts in which it is available), x rays have comparatively little penetration and much quantity. If we could get the penetration of the gamma ray and the quantity of the first-class x -ray tube in one apparatus, we should have an efficiency such as we now only dream of.

Sequeira's¹¹ paper on the treatment of **Malignant Disease of the Skin** is worthy of note by radiologists, who will find in it much of value, and many hints as to the reasons why the reactions to radiation differ in cases of the same, or similar, diseases. Stress is laid on the point that if a case of rodent ulcer is going to do well under x rays, improvement shows at once; if the case is resistant to the treatment, it is an unfavourable sign.

Lichen Planus of the Glans Penis has been successfully treated by x rays by Wise.¹² The disease has a predilection for this locality, and it often persists for years. In two very obstinate cases the author reports good results brought about by small doses of x rays. These results were obtained quickly, and with good cosmetic results.

Kempster¹³ reports that the treatment of **Trichiasis** by x rays gives very satisfactory results. The technique is important both as regards dosage and the protection of the eye. Full details as to the method of eye protection are given, and also the definite dosage required. Cure by the falling out of the hairs was quickly brought about.

In the treatment of **Pernicious Anæmia**, Vaquez and Aubertin¹⁴ have applied massive doses of filtered rays to three cases. These doses are described as 'excitant' doses, and are applied to the knees, tarsus, shoulders, elbows, and sternum. One of the patients was in good health three years afterwards. Examination of the blood whilst under treatment showed a large increase in the red corpuscles, and the improvement is caused by excitation of hæmatopoiesis and not by arrest of the hæmolytic process, the x rays acting in the same way as arsenic.

Mannaberg,¹⁵ in **Exophthalmic Goitre**, exposed the ovaries instead of the thyroid gland in ten cases, with good results. Whilst there was gain in weight and diminished tachycardia, it was particularly in the subjective state of the patients that the x rays seemed to exert a remarkable effect. The combined effect of irradiation of both thyroid and ovaries at the same time was tried in three cases, but was not successful, two of them being made distinctly worse.

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RADIUM.

Abbe,¹ experimenting with radium three years ago on the growth of seeds (MEDICAL ANNUAL, 1913, p. 67), concluded that stimulation of growth resulted when the distance was about an inch and a half; less distance produced destruction, more distance retardation of life. As the result of further research on radium beta rays, he finds that some of his former conclusions were erroneous, and he is now of opinion that these newer experiments prove that growth is always arrested whatever the distance. With the help of Professor Pegram a device was worked out by means of a strong electro-magnet which, when tested with a fluoroscopic screen, gave a brilliant display of isolated beta rays on one side and of gamma rays on the other, in apparently equal proportion. With this knowledge it then became possible to study the effects of the magnetically separated rays in large quantities. Drawings and explanatory photographs of the experiments illustrate this paper, and the results were tested on the early development of two marine invertebrates—*Nereis limbata* and *Arbacia punctulata*. The main result of all this work was to show that growing tumour cells of certain types are arrested by the action of certain radium rays, and that it is the beta rays which are responsible for this checking of tumour growth. It seems probable that it is the evolution of new secondary beta rays in the deep structures, rays produced by the gamma rays on meeting resistance, which must be considered the agent of greatest efficiency in radium work. These rays are electrons or particles discharged from the radium atom, each bearing a charge of negative electricity. What the force is which actuates living cells is unknown, but it adds one link to the chain of facts to know that a charge of negative electrons carried into certain types of disorderly-growing cell tumours reduces them to orderly growth. The permanency of this checking force is established.

The article on radium by Joly² is valuable to those using this method for the treatment of disease. His description of the rays

arising in radio-active substances, and his comparison of the different radiations, are simply told and easy to follow. The chief purpose of this paper is, however, to describe Ra C, the actual element which gives off the most penetrating beta and gamma rays, and to show how it is more advantageous to make use of the emanation than the radium itself. He explains how the emanation is collected in small tubes which can be introduced into a tumour. Ten or twenty such tubes, each containing $\frac{1}{10}$ or $\frac{1}{20}$ of the dose to be administered, are used, and it is pointed out that by thus dividing up the dose into these small portions it is possible to use less filtration without risk of necrosis; it is less wasteful; cross-radiation is obtained; and more uniformity of radiation than when one tube is introduced at a single point in the tumour. The technique is made easy, as these capillary glass tubes are placed in fine exploring needles which can be introduced into the tissues with the least possible amount of inconvenience to the patient, whilst there is most accurate dosage according to the number and strength of the tubes used. Stevenson's paper³ on the same subject, but dealing more particularly with the cases treated, should be read in conjunction with the above. This new work was referred to in the MEDICAL ANNUAL for 1914, but these two papers amplify the original communications and deal with the subject more fully. Stevenson gives exact details as to the method of preparing the needles for insertion and the best manner of doing this small operation. A very striking case of recurrent malignant polypi of the nose—inoperable—with glandular involvement, treated on these lines, gave a very promising result, and shows very well the scope of this method. The results of 22 other cases of inoperable **Malignant Disease** such as breast and uterine cancer, epithelioma of the tonsil, etc., still further emphasize its possibilities.

The report of the Radium Institute⁴ for 1914 adds very little to those of the preceding years, and again it is necessary to draw attention to the fact that it merely deals with the cases treated during the year, without reference to those of former years. One would wish for a report dealing with cases previously treated and giving some information as to the duration of many of the cures. It is now proved beyond doubt that, in many cases of malignant disease, much benefit is the immediate result, and in a certain number of cases the growth disappears; but information as to the duration of life following would be of value. It is interesting to note that, in the table of statistics, out of 746 cases actually treated it is only claimed that 19 were cured, and these include all those treated, many of them not cases of malignant disease at all. The report states that **Epitheliomata** of the buccal, lingual, and pharyngeal mucous membranes prove both refractory and disappointing in their response to radium treatment, but that a new method of application, that of burying a small but powerful radium emanation tube in the growth, has given more promising results in cancer of the tongue. Contrasted with this, in epithelioma of the oesophagus, although no cure is claimed, distinct

though temporary benefit has resulted, more especially from the relief to the swallowing ; while in cancer of the rectum much benefit results and some inoperable cases have been made operable. The question naturally arises as to the reason of the improvement in these latter cases whilst the mouth cases do so badly. **Uterine Cancer** is stated to continue to yield gratifying results, and the effects of radium treatment in inoperable cases are far in advance of those obtained by any other known medical or surgical methods. Of 27 cases of uterine cancer, 1 was apparently cured, 17 were improved, 7 not improved, and 2 died. In **Lymphadenoma** the striking feature is the rapidity with which the glandular swelling diminishes, this often being perceptible within a week of the first exposure. The best results occur in those cases where the spleen is unaffected. The report covers a wide ground, and deals with practically all kinds of conditions suitable to radium treatment, including the internal administration of the emanation for **Arthritis Deformans**, and the prophylactic treatment following operations.

Dawson Turner⁵ reports on 63 patients treated at the Edinburgh Royal Infirmary during 1914. He obtained no cure among the malignant cases, but there were relief of pain, cessation of discharge, healing of ulcerated surfaces, and prolongation of life. In six cases of **Exophthalmic Goitre** radium was of undoubted benefit, and in one a cure was brought about. Its action consists in producing a sclerosis of the thyroid gland, following upon an obliterative endarteritis. A diminution in the exophthalmos and tachycardia are amongst the first results to be observed. Details are given of a large number of the cases, the dosage and technique, and the after-result.

An address by Burnam⁶ entitled *A Brief Outline of the Status of Radium Therapeutics* should be read. Working at the Howard Kelly Hospital with a gram and a quarter of radium, 1300 cases have been treated, some of them four or five years since, but mostly during the past two years. A short description of the chemistry and physics is followed by a report on the technique and methods of application. The author then discusses the rationale of the treatment and the manner in which radium acts. The view put forward is as follows : There is a marked selective tendency to pick out pathological cells. This he explains by saying that it can be assumed that radiation deleteriously affects all living tissue, but that under its injurious influence the normal tissues are preserved, because the fluids and the protective agencies of the body are all constructed to help the normal tissues, and that the pathological tissues disappear because, weakened by the radiation, they are unable to withstand the normal protective mechanisms of the body. An explanation for these views; based on the action of radium in different conditions, follows. The rest of the paper deals in a general manner with the effects of radium in gynaecology, on tumour formations, on the thyroid gland, on skin conditions, etc., and finishes with general conclusions. All the material for this communication is founded on personal observations,

and the author thinks that better methods of radiation will in the future greatly improve the results already obtained. What seems just now to be of great importance is work to determine the cause of the difference in resistance in individuals, and if possible to develop methods of increasing this resistance.

Morison⁷ draws his material from the cases of **Malignant Disease** treated at the Middlesex Hospital, where in four months 160 such patients were dealt with. The illustrations of this paper, microphotographs of sections of the various growths before and after irradiation, are very fine, beautifully reproduced, and show the cell changes, etc., in a remarkable manner. A large number of these are reproduced, and are well worthy of study. He draws attention to the complications which may follow radium applications, such as thrombosis in the vessels, death from sloughing, hyperpyrexia, pain, necrosis of bone, fibrous stricture in the alimentary tract, and so on. The paper concludes with a general survey of the cases treated and the results obtained.

O'Brien's paper⁸ on eleven years' experience of the effects of radium on **Superficial Cancer** is interesting inasmuch as it deals with cases in which the cure has remained for as long as nine years, and the illustrations show the original conditions and the after-results. Most of the cases were of rodent ulcer, which is especially respondent to this treatment, but the long records are of value. He draws attention to an interesting point in the relation of a radium cure of a small epithelial cancer on the cheek which remained cured for nearly seven years, but then the patient presented herself with metastases in the cervical glands, and these killed her one year later. He points out that with cases of this kind occurring, the utmost discretion and caution are necessary in making pronouncements as to the cure of cancer by radium.

Sparmann⁹ relates his experiences in the treatment of malignant tumours by radium, and divides the cases into two categories, those which received preventive and those which received curative treatment. All had arsenic in addition in the form of Fowler's solution. The statistics are of interest, and he states that fourteen were aggravated by the treatment. He is of opinion that recurrence is sometimes hastened by post-operative irradiation, possibly due to a local hyperæmia caused by the radium. He does not believe in any elective effect, and has not observed any specific change in the tissues; all that occurs is a necrosis and subsequent scar formation, such as could be formed spontaneously in any tumour tissue. He concludes that the hopes we placed in radium as a new and successful means in the treatment of malignant tumours have not been realized, and that the number of cases in which one might have recourse to radium therapeutics shrinks as his experience progresses.

Ordway¹⁰ publishes a paper, profusely illustrated, contrasting a large number of cases in groups in which radium has been curative, in which it has been of little or no value, and in which it has been

palliative. His general conclusions do not materially differ from those of most other workers, [but he suggests that newer methods may improve the results. At present he considers that the proved value of radium is limited, but occasionally cases, beyond those well recognized as likely to give successful results, are distinctly benefited.

In **Inoperable Growths of the Nose and Throat**, Hill¹¹ says that speaking generally radium irradiation is worth trying in any malignant growth, but that the round-celled sarcomas and endotheliomas give the best results. The reason why the action of radium on cancerous growths is so uncertain compared with the behaviour of sarcomas and endotheliomas is not clear. Discussing the question as to burying emanation needles in the growths, the author gives a guarded opinion, and thinks further confirmation of the good results of this method is required. His reason for this is that the smaller amount of filtration used in the needling method is opposed to the current practice of using thick screens. His further experience in malignant stricture of the œsophagus confirms him in the belief that the results are striking and numerous, but that while cure is the exception, the relief of symptoms and benefit to the patient fully warrant the employment of this method. This opinion is based on the effects in a further series of twenty cases.

Abbe's¹² paper on **Roentgen-ray Epithelioma** cured by radium is of interest, especially to radiologists. A large number of successful cases are quoted, the technique is explained, and reasons are given for the seeming paradox that the heavy gamma radiation from an x -ray tube will cause a disease which a similar radiation from radium will cure. Abbe explains this by pointing out that it is really the beta ray which brings about the cure. The opinion is expressed that all chronic cases of x -ray dermatitis in the early stage of thick patches, cracked, ulcerated, and painful, or of epithelial growths of basal cell type, can be cured with radium.

McMurray and Johnston¹³ publish, with photographs before treatment and after, some cases of **Epithelioma** and **Angioma** cured by the application of radium. One case of a large angiomatous mass on the cheek which entirely disappeared after five hours' application of 250 mgrams in one-hour doses at five different points is especially striking. Further notable results are illustrated by Abbe.¹⁴ A large lymphangioma of the tongue entirely disappeared, and two similar cases were cured by single applications.

Dawson Turner¹⁵ reports the complete disappearance of a **Myeloma of the Sternum** the size of two fists after the burial in it of comparatively small amounts of radium. In one month after the treatment there was nothing to be seen of the growth. In his experience no tumour is so amenable to radium as a myeloid sarcoma; when energetically treated they melt away in an extraordinary fashion.

As proof of the permanent effects of radium treatment, Morton¹⁶ reports a case of spindle-celled **Sarcoma of the Humerus** which was treated by burying radium tubes in the growth. The patient

was alive and well nine years later. Radiographs showing the condition before treatment, two years and nine years afterwards, illustrate this paper. Another case of carcinoma of the breast treated in the same manner was alive with no recurrence seven years later.

Howard Kelly¹⁷ reports 36 cases of **Fibroid Tumours of the Uterus** treated with radium. This, in quantities varying from 30 to 724 mgrams, was introduced into the uterine cavity, and in some cases treatment was also directed through the abdominal walls. Gamma-ray therapy was applied, the screens being platinum and glass. The ovaries were not treated in young patients. Kelly believes that with increased experience it will be possible in all cases to stop the hæmorrhage, and in most cases to do away with the tumour, and this without risk or serious discomfort.

Schmitz¹⁸ reports 20 cases of **Uterine** and three cases of **Rectal Cancer** treated with radium. The immediate beneficial effects are a disappearance of the putrid odour, the arrest of hæmorrhage, and the alteration in the discharge, and these facts explain the remarkable influence on the patients, who change from listless, moribund people to become healthy, life-enjoying, and hopeful. Unfortunately the good effects are of short duration; but the author hopes that, with increased knowledge and better technique, radium treatment of these conditions will increase in value.

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ELECTROTHERAPEUTICS.

The war has acted as a great stimulus to electrotherapeutic work, and the value of electricity in the treatment of **Wounds, Frost-bite**, etc., soon became apparent from the number of papers communicated by well-known workers. A discussion¹ on the general subject held by the Electrotherapeutic Section of the Royal Society of Medicine in February, 1915, shows the scope of these methods of treatment. Turrell pointed out the value of electrotherapy in the cure of **Old Injuries** such as sprains, strains, nerve lesions, swollen joints, etc., in men who, except for its aid, would be rejected for military service, and gave full particulars of cases directly bearing on this important question. He also described the lines on which he treated frost-bite, especially laying stress upon the relief of the pain brought about by diathermy, detailing the technique and recording typical cases. Russ dealt with the treatment of suppuration, especially from the results of experiments on the *Staphylococcus pyogenes aureus*. The experimental work carried out showed that when a

current of electricity was passed through a pure culture of this organism put into a tube with a 2 per cent sodium chloride solution, after a certain period the staphylococcus passed over until all the microbes were aggregated at one of the electrodes. Nearly all the organisms passed to the positive electrode, and after twenty minutes a large number of them were dead. He then applied the knowledge gained to the treatment of cases, with astonishing and most satisfactory results. This new treatment and the experimental work of Russ mark a most important advance carried out on highly scientific lines.

In a paper on electrotherapy at a base hospital, Turrell² gives statistics of cases and results obtained in a series of 78. From 31 of frost-bite, 24 were discharged as cured, whilst the other 7 still remained under treatment. It is not suggested that they would not have been cured without electrical treatment; but the relief of pain was marked, stasis and swelling were speedily reduced, the vitality of the tissues was increased, and sepsis prevented. Diathermy was the method of choice except when sensation was lost; then the static breeze or the high-frequency vacuum tube. The remaining cases—47 in number—were nerve lesions, rheumatism, neuritis, sprains, etc., and of the whole series, whilst 42 were completely cured, only 4 were unimproved.

Fowler³ has used the *electrolytic bath* in the treatment of **Septic Wounds**, with excellent results. He is much impressed by the manner in which septic wounds welling with pus rapidly become healthy, the pus disappearing and healthy granulation tissue forming. He describes the simple apparatus required, and gives indications for its method of application. The treatment should be given daily for half an hour each time. It is not necessary to employ large currents: one of 20 to 30 ma., a current which is hardly felt, is sufficient for the average bullet wound: more if the wound is a large one, in proportion to its size.

Trench Back, a term applied to a variety of conditions arising from injury to the back in the lumbar and sacral regions, pain and rigidity being its chief symptoms, has been treated successfully by Sandes.⁴ Twice weekly he gives ionization for fifteen minutes, using a 1 per cent sodium salicylate solution, with from 30 to 100 ma. of current. Stress is laid on the importance of large electrodes of equal size. Cases with anæsthesia of the lumbar and sacral regions are not suitable for this treatment, owing to the liability to blisters forming. It is also important, by a previous x-ray examination, to exclude bone injury.

A further paper by Russ⁵ on the electrolysis treatment of **Cystitis** describes the technique and gives illustrative cases. It is important that this is carried out without any pain to the patient; pain or discomfort means a rearrangement of the apparatus, as something must be wrong. The cases quoted in support of this method are very bad ones of long duration, which have resisted all other attempts at cure. The results are remarkable, the diminution of pus, following

the destructive action of the current on the bacteria, being rapid. Retention power increases from the start. As regards the permanence of the results, Russ reports that some of the cases remained well one year afterwards.

The same author⁶ also reports twenty-eight cases of **Acute Gonorrhœa** treated by electrolysis, some of only fourteen days' onset. Again the technique for these cases is described, and it is claimed that the effect is more certain than by other methods: threads and flakes disappear more rapidly from the urine, and there is a marked absence of complications. A 2 per cent solution of sodium iodide is recommended.

Hernaman-Johnson⁷ publishes a valuable paper on the diagnosis, prognosis, and treatment of **Nerve and Muscle Injuries** resulting from gunshot wounds. In both diagnosis and prognosis the investigation of the reactions by the 'condenser' method introduced by the late Dr. Lewis Jones is invaluable, inasmuch as it is possible to gauge objectively the seriousness or otherwise of the various cases which formerly would simply have been noted as responding to faradism. After indicating the varieties of the injuries, the paper goes on to deal with the treatment. Free passive movements, the application of warmth, and the direct application of electricity to the nerves, all assist; but the stimulation of individual muscles by interrupted currents or condenser discharges is the sheet anchor in the treatment of nerve-muscle injuries.

Grace⁸ indicates the uses of static electricity in medicine and surgery in a paper illustrated by notes on cases. Chronic synovitis of the knee-joint is quoted as typical in showing the results of this treatment, marked improvement starting from the first application. The writer describes it as a deep massage of all the tissues, but intensifying towards the electrode, the result being the relief of stasis. A further use of the static induced current is in the stimulation of muscles which have degenerated from one cause or another.

Diathermy.—In 1915 we referred to three papers by Cumberbatch⁹ on this subject, and we have now to call attention to the completing articles. The first of these explains the physiological effects of diathermy, and deals with the rise in the body temperature which results, the effects on the sweat-glands, its influence on the vascular system and the respiratory system, and details some experiments on animals. It is interesting to note that experiment showed that when a diathermy current was passed through the thorax of a dog, according to the amount of current used, the mediastinal temperature rose 7.2 degrees F. The following article deals with the destruction of diseased tissues by this means and shows experimentally how it is brought about. The technical principles are explained, and various electrodes suitable for different applications are described. In a further article, more descriptions of electrodes and the manner of using them are followed by instructions as to the regulation of the current and its method of application, and it concludes with a short note on the results obtained and the duration of life after treatment of inoperable growths.

Another paper¹⁰ by the same author deals with the treatment of **Inoperable Malignant Growths** by diathermy, and the results in eighteen cases are given in detail. They include growths of the mouth and throat, the tongue, the female genitalia, and the bladder. The relief of symptoms, the cessation of hæmorrhage and discharges, and at any rate some prolongation of life under more comfortable conditions, were the chief changes brought about. In a few cases the benefit was more marked. In a concluding paper¹¹ the treatment of **Non-malignant Growths** is considered. In one case of recurrent fibroma of the nasopharynx, after a series of applications cure seemed to have resulted. Success followed in some cases of *Nævi*, but sloughing necessarily occurs, and this method has no advantages over electrolysis when the latter is possible. Other successful results were obtained with warts, epulis, lymphangioma, etc. This whole series of papers forms a very complete account of diathermy and its possibilities, and is a valuable addition to the work already published, inasmuch as it is comprehensive.

Fullerton's¹² article on **Vesical Papillomata** treated by the high-frequency current, in which he describes the cure obtained in two cases, seems to point to a possible further use for diathermy, as, though he describes it as 'high-frequency current,' it is the same thing as diathermy. Fullerton believes that its action is simply that of a cautery, but it is easy of application, picks out the smallest villi, is without risk, and the villous processes are destroyed and so cannot graft on to fresh places in the bladder wall.

Matthews¹³ describes cases treated by a combination of *fulguration and thermo-radiotherapy* in Keating-Hart's clinic. The principles of this treatment are that the heating of the new growth is accomplished by diathermy, needles being introduced into the growth and as much as from 1 to 2 ampères of current passed through; at the same time an ice-bag is applied to the skin with firm pressure, and also at the same time a full *x-ray* dose is administered. Repeated treatments to different parts of the growth effected cures in some cases in which operation and *x-ray* treatment alone had failed. As showing what this method can bring about, he quotes a case of **Lymphosarcoma** with large deposits in the neck, axilla, and groin. *X-rays* alone gave temporary benefit, operation failed; under thermo-radiotherapy the tumours resolved, and the patient remained well two years and a half later. Pfahler¹⁴ combines electrothermic coagulation and *x-ray* treatment in **Inoperable Malignant Disease**. He recommends vigorous *x-ray* treatment before the tissue destruction by diathermy, and follows up the latter with a further course of *x rays*. In giving the *x rays*, Pfahler divides up the skin area into a number of areas and directs the rays through one of these at a time whilst protecting the rest; by this technique he gets a much larger dose to the central parts of the growth. His address on this subject describes the technique and the reasons for it, discusses the advantages and disadvantages of the combined method, and is illustrated by a series of

striking cases photographed before and after treatment. Whilst good results were obtained in many perfectly hopeless conditions, the time which had elapsed did not warrant an expression of opinion as to their permanency. The advantage of the diathermic method of removal seems to be that metastasis is less likely to occur, because the operative area is at once completely closed.

Diathermy in the treatment of **Inoperable Growths of the Nose and Throat** is the subject of a paper by Harmer.¹⁵ The technique is described in full detail. He reports his results in twenty-one cases of malignant disease, and says that nearly all the patients suffering from cancer were enormously improved; one man, with carcinoma of the tonsil and tongue, after five applications lived for two years, with little discomfort till the last three months. Without claiming cure for these advanced cases, the destruction of large masses of growth, the relief of distress, the elimination of the septic element, and the probable prolongation of life under more favourable circumstances, suggest that this method is valuable and deserves more general use.

Under the title "*The Desiccation Treatment of Congenital and New Growths of the Skin and Mucous Membranes*," Clark¹⁶ describes a method which he claims as a new principle in its application for surgical purposes. He uses a 24-plate static machine, but the unaltered current cannot be employed for desiccation: it must undergo a physical transformation analogous to the metamorphosis of a volume of water into spray or steam. This is done by introducing into the circuit Leyden jars and a resonator. He compares this with, and differentiates it from, other electro-surgical methods, and claims that his results are brought about by a desiccation which devitalizes by dehydrating the tissues. Readers must refer to the original paper for a detailed description of the apparatus and its method of application. It is claimed that it is successful in all accessible benign neoplasms or lesions of the skin, and curative in the majority of localized malignant lesions of the same organ.

In **Onychia**, Hugo¹⁷ advocates *ionic medication* with a 2 per cent solution of zinc sulphate. Lint soaked in the solution is insinuated within the nail fold and the current applied in the usual manner. One application was sufficient in one case, and two in another. The discharge altered in character at once, and cure rapidly followed. One was a severe case of eighteen months' duration. This method seems well worthy of trial.

Dausset¹⁸ discusses the possibilities of treatment by the utilization of *ultra-violet rays* from a quartz mercury vapour lamp. He describes the technique, pointing out that superficial conditions should be treated by the unfiltered rays, and that deeper effects can be obtained by filtering the rays through glass the composition and thickness of which are known. In treating the deeper parts with filtration, exposures of long duration have been given without burning, the skin being pigmented as in natural heliotherapy. Unfiltered treat-

ment is suitable for **Acne, Sycosis, Indolent Wounds, Ulcers, Tuberculosis of the Skin**, and such like, whilst filtered rays are useful in **Arthritis, White Swelling**, etc. He concludes that in this lamp we possess a very powerful source of light, the direct action of which can be utilized in default of natural heliotherapy.

The rapid arrest of acute inflammation by *dielectric treatment* is the subject of an article by Wilson.¹⁹ The author enters into a long discussion on the electrical conditions of the body in health and disease, and the trophic influence on cell-metabolism. He describes a neuro-electricity conveyed to the cells by the nerves, and says that, from the point of view of the electrician, temperature means a breakdown of local insulation. The first step then in dealing with acute local inflammation should be to stop this leak or escape of neuro-electricity by the action of a suitable dielectric. This dielectric must be a harmless, insoluble, and indecomposable fluid of great penetrative power and high electrical resistance. Liquid paraffin is the substance chosen, and he gives directions as to its application, claiming the rapid arrest of inflammation as an immediate result.

REFERENCES.—¹*Proc. Roy. Soc. Med. Electrother. Sect.* 1915, 35; *Lancet*, 1915, i, 494; ²*Lancet*, 1915, i, 229; ³*Brit. Med. Jour.* 1915, ii, 433; ⁴*Ibid.* 215; ⁵*Lancet*, 1914, ii, 1040; ⁶*Brit. Med. Jour.* 1915, i, 999; ⁷*Ibid.* ii, 84; ⁸*Lancet*, 1915, i, 180; ⁹*Arch. Rad. and Elect.* 1914, ii, 205 and 240; 1915, i, 282; ¹⁰*Ibid.* 337; ¹¹*Ibid.* ii, 10; ¹²*Brit. Med. Jour.* 1914, ii, 834; ¹³*Ind. Med. Gaz.* 1914, 340; ¹⁴*Surg. Gyn. and Obst.* 1914, ii, 783; ¹⁵*Jour. Laryngol. Rhinol. and Otol.* 1914, ii, 481; ¹⁶*Jour. Amer. Med. Assoc.* 1914, ii, 925; ¹⁷*Arch. Rad. and Elect.* 1915, i, 437; ¹⁸*Med. Press and Circ.* 1914, ii, 586; ¹⁹*Ibid.* 592.

Part II.—The Dictionary of Treatment.

A REVIEW OF MEDICAL AND SURGICAL PROGRESS FOR 1915, BY MANY CONTRIBUTORS.

GENERAL REVIEW.

ABDOMINAL SURGERY.—Here, as elsewhere, the echoes of war are heard. One of the most interesting of Dr. Wyllys Andrews's paragraphs is that which deals with penetrating abdominal wounds. Otherwise there is little that is strikingly new, though the paragraph on intestinal stasis brings promise of further light on an obscure subject. Sampson Handley's extremely important account of 'ileus duplex' receives recognition. In gall-bladder surgery some progress has been made in the devising of plans for reconstruction of the duct.—[Ed.]

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ANÆSTHETICS.—A good deal of attention is being paid to the question of the advantage of combining two or more methods in the course of a single case. Not to mention the common use of an additional narcosis from alkaloidal drugs in conjunction with the effects of a general anæsthetic, we have now put before us the value in certain cases of using general anæsthesia as a measure superadded upon the analgesia of intraspinal injection. Not only is this double effect desired sometimes, but even the triple one produced by a preliminary injection of scopolamine, morphia and atropine, then an intraspinal injection, and finally the total abolition of consciousness by inhalation of a general anæsthetic. Although the proceeding sounds complicated, and should certainly only be instituted by those thoroughly acquainted with the effects of the different measures involved, there can be no doubt about the excellence of the results when cases are carefully selected. Crile's anoci-association method is another familiar instance of this practice by a combination of procedures.

The past year does not furnish evidence of any striking novelty in anæsthetic practice, and indeed the all-pervading war conditions militate against any but the simplest and best-proved methods occupying the attention of practitioner and anæsthetist. Rectal methods on new lines are being given a trial to some extent. The difficulty of obviating distressing distention of intestines by the liberated ether vapour seems to be one of the chief obstacles to its usefulness.—[J. B.]

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CIRCULATORY DISEASES.—Of late, improved technique has added greatly to our knowledge in two directions. First, the study of disordered function during the past decade by the application of the newer physiological methods has illuminated many of the dark places and unexplored areas of cardiology. Second, an even more fundamental change is coming over our conception of heart disease. This is sufficiently indicated by the headings of the paragraphs on the subject in the present volume. From these it will be seen that we are learning to think of cardiac lesions in terms of etiology. This cannot but add enormously to our precision and success in diagnosis, prognosis, and treatment.—[C. C.]

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CLINICAL PATHOLOGY.—The attention may be directed mainly to the literature on cerebrospinal fluid, and upon that of peritoneal exudates. Each of these subjects has been illuminated by useful contributions.—[O. C. G.]

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DERMATOLOGY.—During the past twelvemonth most of the Continental journals dealing with dermatology have ceased publication or appeared at long intervals. Some interesting debates have taken place in the Dermatological Section of the Royal Society of Medicine, and fuller attention is directed to these in the following pages.

Some prominence has been given in the Metropolitan press to experiments in treatment of skin and other diseases by the rays produced by the Simpson lamp. These rays have been demonstrated by physicists to occupy well-known portions of the spectrum, chiefly in the ultra-violet field, and are almost identical with the rays produced with the incandescent arc between pure tungsten terminals. They have been somewhat absurdly described as a 'new x ray,' although they occupy an absolutely different part of the spectrum. Their therapeutic effect is also entirely different, and present information classifies the Simpson lamp as a somewhat inconvenient apparatus for producing a light rich in ultra-violet rays.—[E. G. L.]

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DISEASES OF THE EAR, NOSE, AND THROAT.—Great attention is being paid to the traumatic lesions of the auditory apparatus, especially those due to loud sounds, explosions, etc. The operative procedures for removal of tumours of the eighth nerve (cerebello-pontine angle tumours) have also been discussed. The psychology of deafness and modern methods of educating the deaf child are being much debated in America.

The intranasal operation on the tear sac introduced by West appears to be gaining ground.

A vigorous attempt is being made to investigate the pathological

chemistry of hay fever, and thus to discover a scientific method of treatment.

Brown Kelly has pointed out the difficulties and dangers of proof puncture of the antrum, especially if air be forced in through the cannula. The tendency in frontal sinus operations is still in the conservative direction. Grayson, of Philadelphia, has introduced a safe and useful method of exploring the sphenoidal sinus. Tilley has described the symptoms and signs in cases of aspergillosis of the antrum, while Bliss and McNab call attention to the nervous phenomena associated with accessory sinus suppuration.

Gaub and Jackson's combined method of treating pulsion diverticulum of the cesophagus is to be noted. The vexed question of 'cardiospasm' has not yet been decided, but Hertz's paper on achalasia of the cardia merits attention. An interesting article on the gullet by William Hill is also included.—[J. S. F.]

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GENERAL SURGERY.—The war has brought excellent additions to the surgeon's armamentarium in almost every direction. Wright's advocacy of the local treatment of sepsis by means of hypertonic salt solutions calls for pause to reflect on the treatment of discharging sinuses half a century ago by the application of seaweed and seawater!

Hypochlorous acid, while not exceeding expectations, is recognized as a disinfectant and antiseptic of exceptional potency. Its use has rapidly become general. The word rheumatism is to disappear, and the old involved classifications of non-traumatic joint lesions are embodied in the term 'metastatic arthritis.' Every form of arthritis is accounted for by a primary microbic focus in the manner familiar in cases of gonorrhoea.

Bone-grafting absorbs great attention, and Albee has established its applicability in Pott's caries.

Fractures of the lower extremity are now treated universally by some modification of the old Thomas' knee bed splint. It is astonishing to find the best descriptions of the 'modern' treatment of fractures in the old authors such as Erichsen. The question of the plating of compound fractures is still in the controversial stage.

The treatment of angiomas and goitre by injections of boiling water deserves attention, and the differentiation between myelomas and malignant giant-celled sarcomata of bone is of the utmost clinical importance.—[W. I. de C. W.]

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ACUTE INFECTIOUS DISEASES.—The two outstanding facts during the past year have been the recrudescence of cerebrospinal fever in the British Islands, and the occurrence of paratyphoid fever (A and B) in addition to typhoid amongst the warring armies on the Continent. Hitherto paratyphoid A has been confined to the East, and especially to India. A large amount of investigation has been already, and is

still being, undertaken into the nature and causes of these diseases. How cerebrospinal fever was introduced into the country is a moot point; but paratyphoid A appears to have been brought to Europe from the East by native troops from India. The simultaneous occurrence of the three forms of enteric disease has necessitated the employment of very strict methods of diagnosis, and to the elaboration of such methods much time and skill have been devoted.

Typhus raged in Serbia in the early part of the year; but the circumstances in which it occurred were not favourable to its bacteriological study. Experiments on the causation of scarlet fever, by W. Mair, appear to promise fruitful results in an inquiry which has hitherto been singularly barren. Attention is directed to the Schick test as a method of determining the state of immunity towards diphtheria in any given individual.—[E. W. G.]

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MENTAL DISEASES.—The two schools of thought in psychiatry continue to show little indication of mutual understanding. In one school the physical concomitants of mental disease are felt to be all important; in the other the psychological stresses are looked upon as paramount. Two valuable series of lectures which have been recently published illustrate this division of opinion: Edwin Goodall's Croonian Lectures on *Modern Aspects of Certain Problems in the Pathology of Mental Diseases*, and Stoddart's Morrison Lectures on *The New Psychiatry*. Although the subjects dealt with are not exactly comparable, yet practically speaking the one deals exclusively with material things—history, chemistry, and pathological findings—the other with immaterial things—complexes, repressions, psychological stresses,—and there seems to be no common ground whatever between them. The lecturers both seem to ignore the aspect of the subject treated by the other.

Light on this subject is being thrown by the production of a great variety of mental disturbance by shock or concussion without any known physical injury. It appears that shock is able to set alight latent mental symptoms, and that when once ablaze, little good is attained until the original cause, the smouldering, combustible material, is dealt with. Here at any rate the influence of micro-organisms can be neglected, and there is reason to think in many cases that the underlying cause may be found in the strain arising from imperfect adaptation to the necessities of life, and that recovery is not secured until the past history of the case is unravelled and the difficulties are frankly faced.

The discovery of living spirochaetes in the brain of general paralytics has not yet finally settled the connection between syphilis and this disease. Inoculation experiments with living organisms from general paralysis have been negative, whilst similar inoculations with spirochaetes from tertiary syphilis have been successful. Moreover, the almost invariable absence of lesions of tertiary syphilis in

general paralysis is not easily explained if the diseases are due to the same cause.—[B. P.]

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NERVOUS DISEASES.—The most interesting contributions to this subject during the past year are those emanating from the trenches and the various great base hospitals, and may be summarized as the neurology of war. While the nervous ailments and injuries of war do not differ essentially from those observed in civil life, the fearful effects of modern methods of warfare, and the terrific mental and nervous strain to which the troops are subjected, have served to produce a mass and variety of clinical material which is unique in the history of medicine. Of especial interest are the psychoneuroses, the different varieties of shell shock, and the various psychic and nervous manifestations which have resulted. This field alone constitutes an enormous economic problem in its relation to permanent disability and pensions, and the importance of appropriate psychic treatment is obvious.

The study of gunshot injuries of the brain, spinal cord, and peripheral nerves has received a new impetus. The fungus cerebri, which since the aseptic era had practically disappeared from civil practice, once more becomes an acute problem. Wounds of the superior longitudinal sinus, because of the limited exposure in modern trench fighting, are now quite common, requiring special methods of treatment. Interesting experimental studies have been made on the mechanical effects of projectiles on the skull and brain.

Perhaps no field has awakened greater interest than wounds of the peripheral nerves. Here much has been added to our knowledge of the various clinical types, diagnostic methods, and treatment. New features in symptomatology are the partial lesions of the nerve trunk, with their dissociated syndromes, produced by central and parietal injuries of the nerve, so that it has now become a question of the distribution of the fascicles and not of the nerves alone. The varieties of perineural lesions and their surgical treatment are also questions of importance. The operative indications form the subject of numerous contributions, nearly all the writers advocating most conservative measures. The treatment of incurable cases by the systematic education of other muscle groups to compensate for those paralyzed is being carefully developed, and offers some promise to this otherwise hopeless class of cases.

What might be termed a new type of vasomotor disturbance is the so-called 'trench foot' or 'frostbite.' This interesting condition occurred with great frequency during the recent winter campaign, induced by cold, pressure of foot-gear, dependent position, and prolonged exposure in the wet and muddy trenches of Flanders. Elaborate investigations, with important suggestions as to prophylaxis, are contributed by many observers.

In civil practice, the diagnosis, pathology, and treatment of syphilis

of the central nervous system have perhaps received the most attention. Of especial interest in this field is additional evidence of early involvement of the nervous system in the primary and secondary stages: early symptoms referable to the acoustic nerve and the so-called nerve relapses ('neuro-récidives'). The parasymphylis of Fournier is firmly established as parenchymatous syphilis due to the activities of the *Spirochæta pallida*, and the direct treatment of the central nervous system is now one of the burning questions of the day. The various intraspinal and intracerebral methods of treatment are described, with salvarsanized serum, standardized salvarsanized serum, neosalvarsan in concentrated solution, and the mercurialized serum.

Cerebellar symptomatology is also an active and growing field, and there are contributions to cerebellar localization, diagnosis and treatment of cerebellar abscesses, and a new type of cerebellar disturbance, the 'dyssynergia cerebellaris progressiva.'

Epilepsy, as an early sign and forerunner of cerebral tumour, and the prognosis in epilepsy, are also considered, and are of great practical importance to every clinician. There is also a review of some of the more recent suggestions for the treatment of this disease.—[J. R. H.]

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OPHTHALMOLOGY.—The number of papers which call for notice is necessarily much smaller than in previous years. Chief interest attaches to the treatment of wounds of the eyes and to cases of traumatic blindness, temporary and permanent. In this connection the work of the Royal Society of Medicine in helping to solve the question of the definition of blindness is important.—[A. H. T.]

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PÆDIATRICS.—A method by which infants admitted to a children's hospital can be given a quantity of breast milk has been devised in Chicago, and has met with some success. The artificial feeding of infants remains much as before, different methods being in vogue in different countries, and superiority being claimed for each. The practice of 'whole-milk' feeding appears to be gaining ground.

The almost universal infection of children by tuberculosis is becoming conceded, and as a natural result attention is being paid to the distinction between tuberculosis as an infection and tuberculosis as a disease requiring treatment. It is being more and more recognized that the earliest gross lesions are to be found in the lymphatic glands, especially those within the thorax, but opinions are still at variance as to whether or not these are preceded by minor foci within the lungs. The symptoms and signs by which tuberculous intrathoracic glands may be detected have recently been much amplified. It would also appear that infection with the bovine form of bacillus is much commoner in the British Isles, particularly in Scotland, than on the Continent or in America, which provides a serious indictment of our milk supply.

The number of conditions ascribed to congenital syphilis continues to increase, and further additions have been made to our knowledge of the disease, especially as it affects bone and joints. The ease with which congenital syphilis may be overlooked, if the characteristic stigmata alone are relied upon, is emphasized.

The importance of defects of the thymus gland is receiving attention, although the experimental results obtained in animals can, at present, be scarcely recognized in pædiatrics.

The once generally accepted view that rickets is a purely 'deprivation' disease is rapidly losing credence.—[F. L.]

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TROPICAL DISEASES.—In spite of the great War, steady progress has been made in our knowledge of tropical diseases during the past year. Owing largely to the increased cost of thymol, oil of chenopodium has become established in the treatment of ankylostomiasis. In the Philippines, beri-beri has been successfully prevented among the scouts by proper dieting based upon the polished-rice theory. Increasingly favourable results have been reported in the treatment of cholera, partly as a consequence of the use of alkalis and atropine in addition to hypertonic saline and permanganates. In kala-azar, promising results have been achieved by Italian doctors, and independently by a worker in India, by the use of tartar emetic intravenously, and in India by inunctions of antimony ointment. Useful work has been done on malaria-carrying mosquitoes in the Philippines, and a valuable summary of our knowledge of trypanosomiasis has been published in the Croonian Lectures.—[L. R.]

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URINARY SURGERY.—Those difficult and obscure cases in which there is obstruction at the neck of the bladder, without enlargement of the prostate, were discussed at the American Urological Association, 1915, and the conditions found were rather more clearly defined than had previously been the case. The subject, however, was not exhaustively treated, and still leaves room for original work. Operations on tumours of the bladder also formed a subject of discussion. In regard to cutting operations, no advance was made on the work published at the International Urological Congress in 1912, and no results were given.

The treatment of benign growths of the bladder by the Beer high-frequency method is the subject of a number of articles.

A number of papers on pyelography appear in the literature for the last twelve months. For the most part they deal with the dangers which result from infiltration of the kidney with the fluid injected into the pelvis.

An important review of literature and experimental investigation on the subject of ligation of one ureter is contained in an article by W. C. Jones. The ultimate result of genital tuberculosis in the male

is also discussed. Seminal vesiculitis and changes in the verumontanum in chronic urethral disease have received some attention; also benign tumours of the urethra.—[J. W. T. W.]

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VENEREAL DISEASES.—As regards treatment, the only things worth consideration are the new substitutes for salvarsan, and Russ's electrolytic treatment for gonorrhœa. Concerning the latter, it is claimed that acute gonorrhœa is cured in three weeks by its application for about half an hour a day. But, as gonorrhœa can be cured in a favourable case in that time, and in an unfavourable case in six to eight weeks, there is no apparent advantage. The substitutes for salvarsan do not appear to be as good as the original, which is not saying much.—[C. F. M.]

ABDOMEN, PENETRATING WOUNDS OF.

E. Wyllys Andrews, M.D., F.A.C.S., (Chicago).

Richards¹ describes the four months' work in a casualty clearing station, where he observed a large number of wounds of the abdomen. In wounds of the colon and duodenum, extravasation occurs rapidly, but not in the small intestine, or only slightly. When the colon is wounded extraperitoneally, fæces are expelled under pressure into the connective tissue, forming large abscesses. This is not observed in wounds of the jejunum and ileum, unless the perforation is of large size. Even where the intestine was nearly divided, the escape of material was slight from the small bowel. Around such a perforation is a limited local peritonitis. A few of these cases remain free from symptoms, and recover in spite of perforation; but most, by the time they reach the clearing hospital, have general peritonitis and ultimately die. The treatment of these wounds requires primarily the closing of the leak, especially in the colon and duodenum. In the small intestine the proper course is to resect the injured portion, together with any damaged adjacent bowel. In one of the writer's cases, $2\frac{1}{2}$ ft. were removed thirty-six hours after the wound, and the patient made a good recovery. Similarly, in another, $4\frac{1}{2}$ ft. were resected after eighteen hours, with good recovery. Early operation is to be urged in these cases, as giving a high percentage of recoveries, but most of them are brought by the ambulance after a long wait in the field.

Mummery² reports on injuries of the rectum or pelvic colon from bullet and shell wounds. These must be very serious, and show a higher mortality than injuries to the other parts of the alimentary canal, on account of concomitant injuries of the large vessels or from general peritonitis. Going back to the Boer war, the mortality of wounds of the rectum was 30.7 per cent. In the present war no figures are obtainable, but it is obvious that the mortality is still very high. The injuries vary from clean bullet wounds to large lacer-

ated wounds due to fragments of a shell. Occasionally high-velocity bullets pass cleanly through the pelvis or abdomen, making such small perforations that no serious result follows; hence it happens that in the Boer war many cases recovered under rest and conservatism. Wounds of the large bowel are often complicated by fractures of the pelvis and injuries of the large nerve-trunks or blood-vessels. Healing is exceedingly slow, and recovery rather unusual. Mummery advises non-operative or conservative treatment rather than surgical interference, in pelvic injuries especially.

Manges³ discusses eventration of the diaphragm, sometimes spoken of as hernia of the diaphragm, from the standpoint of the radiologist. Traumatic rupture of the diaphragm produces hernia into the pleural sac, which, unlike all other hernias, is devoid of peritoneal fat. While usually traumatic in origin, these herniæ are sometimes of obscure or congenital etiology. The interest in this paper is enhanced by the excellent skiagrams, which it is impossible to reproduce here.

REFERENCES.—¹*Brit. Med. Jour.* 1915, ii, 213; ²*Ibid.* 1914, ii, 914; ³*N.Y. Med. Jour.* 1914, ii, 799.

ABDOMINAL PAIN IN CHILDREN. (*Vol.* 1915, p. 85.)

ACRODERMATITIS CHRONICA ATROPHICANS.

E. Graham Little, M.D., F.R.C.P.

Wise and Snyder¹ contribute a carefully reported case and general review of this rare disease. It is a form of progressive atrophy of the skin, of inflammatory origin, usually beginning on the backs of the fingers and the feet, progressing slowly upwards. The early inflammation is succeeded by infiltration, and this in turn by atrophy. Fibrous nodules about the knees and the elbows, pigmentations and depigmentations, telangiectases, desquamation, and cutaneous hæmorrhages may also occur in association. Four chief diagnostic points are relied upon to distinguish this from other clinical types of atrophy. (1) The disease begins on the skin of the extremities and advances centripetally. (2) Three stages, inflammation, infiltration, atrophy, mark the progress. The ultimate atrophy causes the skin to appear transparent, crinkled, with a silky or velvety feel. (3) The presence of the so-called ulnar band, a linear strip of inflamed skin running up from wrist to elbow along the line of the ulna. A similar band may also occur on the leg. Later, the inflamed strip is also overtaken by atrophy. (4) Even in extensive distributions the triangle of skin contained between Poupart's ligament and the sides of the thigh remains free. The course of the disease is extremely chronic, and seldom threatens life. The majority of patients suffer no inconvenience from itching or other subjective symptoms. Treatment is little more than palliative, but the application of **Dry Heat**, injections of **Fibrolysin**, and the administration of **Arsenic** and of **Thyroid** have been attended with some success. The etiology remains entirely obscure, but in a certain proportion of instances syphilis co-exists with the affection, as in the case here reported.

• REFERENCE.—¹*Amer. Jour. Med. Sci.* 1915, i, 508.

ALCOHOLISM. (*See MENTAL DISEASES.*)**ALIMENTARY TOXÆMIA AND CHRONIC INTESTINAL STASIS.** (*Vol. 1915, p. 89.*)**ALOPECIA AREATA.** (*Vol. 1915, p. 96.*)**ALOPECIA, EPIDEMIC.***E. Graham Little, M.D., F.R.C.P.*

Bowen reported in 1899 two epidemics, occurring with an interval of six years in the same school, an asylum for homeless girls, of a peculiar form of alopecia, the bald areas being small, of angular outline, and very numerous. Since that paper appeared, Dreuw reported a curiously similar epidemic in a public school in Berlin, with the difference that in Dreuw's epidemic, which was investigated by a special commission, it was established that "in about 10 per cent of the cases" a permanent atrophy developed in the bald areas, and it was finally accepted by the commission that the affection was the initial stage of a quite different process, allied to the pseudopéladé of Brocq, and best designated 'alopecia atrophicans.' Bowen¹ therefore undertook an inquiry into the subsequent history of his own patients, and is now able to state that there has been no occurrence of the sequel observed in Dreuw's cases. Two other epidemics in schools, very similar to those seen by Bowen, were recorded by Colcott Fox and by Davis, but without any subsequent history as to the later development of atrophy. There were clinical differences furnishing means of distinction of these cases from common alopecia areata, and Bowen consequently proposes to withdraw these cases from the group of alopecia areata, and to apply the name 'epidemic alopecia in small areas,' so as to emphasize their special nature.

REFERENCE.—¹*Jour. Cutan. Dis.* 1915, May, 343.

AMŒBIASIS.*Sir Leonard Rogers, M.D., F.R.C.P.*

ETIOLOGY.—Craig¹ accepts Walker's view that *Entamœba histolytica* includes the so-called *E. tetragena*, and gives a good account of the morphology of the parasite. Many antiseptics easily kill the vegetative forms, but the cysts are much more resistant, although when kept in moist fæces they liberate young entamœbæ within about a week. The cysts resist the action of gastric juice, but are killed by drying in a few minutes. Emetin 1-100 kills them in thirty minutes, but 1-10,000 fails to do so even after twenty-four hours. X rays have no effect on the cysts. After an attack of amœbic dysentery, patients may remain carriers of the cysts and be infective to other people. Microscopical examination of the stools is necessary for their detection.

A. W. Sellards and W. A. Baetjer² report on a careful study of three cases of chronic diarrhœa in which they found entamœbæ which differed in some respects from both *E. histolytica* and *E. coli*. The bowel symptoms were continuous, and not intermittent as is usually the case with chronic amœbic dysentery. The amœbæ found were

pathogenic to animals, and would not grow on culture media, but those found in their patients showed only one to three nuclei, while in the infected animals up to four and six nuclei were seen in the encysted form. They conclude that they are atypical *E. histolytica* temporarily modified by environment.

M. Couret³ has examined the stools of 200 hospital patients for amœbæ before and after a mild laxative, and found them most readily after the purge, in 41, or 20 per cent. A few who remained under observation as long as two to four months remained free from intestinal symptoms. The characters of the organisms suggested *E. coli*, from two to eight daughter cells being frequently found in encysted parasites. Unlike other observers, he obtained cultures in all the positive cases, and claims to have obtained six distinct species. The associated bacteria were killed by double normal sodium hydroxide solution. Animals which are susceptible to *E. histolytica* could not be infected with the cultures obtained from his cases, nor could lesions be produced in the liver. This confirms Walker's work showing that pathogenic amœbæ cannot be cultivated, although he also failed to cultivate the *E. coli*.

F. C. McCombie⁴ found amœbic dysentery to be less prevalent than the bacillary form on tea gardens in Assam.

W. J. Lynn⁵ found amœbæ in the urine of a patient suffering from incontinence, with blood and pus in the urine. After taking a rectal lavage he had used the same syringe and solution for washing out his bladder. He rapidly recovered under **Emetine**.

TREATMENT.—Reports on **Emetine** treatment (see p. 18) of amœbic dysentery and hepatitis show that the drug is firmly established as a reliable specific for these diseases. On the other hand, it is now clear that many cases relapse, although readily yielding to a repetition of the treatment, just as in other protozoal diseases, notably malaria. This appears to be due to the encysted stage of the parasite in the bowel resisting the drug, although reinfections in a tropical country must not be overlooked as a cause of the recurrence of the disease. The following experiences have been recorded during the past year.

L. R. De Buys⁶ met with four cases of amœbic dysentery in children among 3000 hospital patients in New Orleans, and has seen eight in all. There was less fever and systemic disturbance than in the bacillary form. In a child of seven he gave $\frac{1}{2}$ gr. emetine three times a day, and continued it as long as amœbæ were found on passing a rectal tube. Rapidly good results were obtained, even in cases of eight months' to three years' duration. One patient, who was irregularly treated, relapsed. Two were treated with ipecacuanha, but he found emetine far more effective and easy to use. C. C. Elliot⁷ reports favourably on the emetine treatment in South Africa, where he found some medical men who were not acquainted with the method.

E. F. Haines⁸ reports that the drug has been used with great success in China. In the Philippines he had an opportunity of watch-

ing the bismuth treatment of amœbic dysentery, and found that it gave poor results in acute cases, while chronic ones went from bad to worse, and in one instance, he thinks, fatal perforation was produced by a coating of bismuth bottling up the amœbæ in the depths of an ulcer. He has never seen any form of bismuth cure a case of dysentery due to the *E. histolytica*. On the other hand, the response to emetine was remarkable, many patients being saved from being invalided, and restored to far better health than they had enjoyed for years. Some cases continue to harbour encysted forms, and may be carriers, and he suggests quinine irrigations of the bowel to complete the cure. F. J. Harpur and W. B. Haddad⁹ report the use of emetine in doses up to 1 gr. three times a week in out-patient practice in Egypt in twenty-seven cases, all but one of which were chronic, with excellent results. Two cases recurred within a few weeks, and one had a third relapse after six months.

G. L. Jones¹⁰ says that although emetine is one of the most valuable drugs in intestinal amœbiasis, hypodermic injection alone will not permanently cure amœbic dysentery, but relapses occur. He thinks that if it is supplemented by ipecacuanha in large doses by the mouth, most cases will be cured by killing the amœbæ remaining in the bowel after emetine has destroyed those in the tissues. The ipecacuanha is better tolerated after injections of emetine. Llewellyn Phillips¹¹ also discusses the question whether emetine will bring about a radical cure. He has seen relapses of amœbic dysentery after emetine treatment; but he agrees with Chauffard, that in hepatitis and abscess of the lung, complete cure is effected by the drug. The relapses in the bowel disease are due to persistence of the resisting encysted forms, which are not readily killed by emetine. Experiments show that emetine and ipecacuanha by the mouth or by rectum also fail to destroy the cysts. He prefers to continue the emetine injections up to ten days, and then to give it orally for some time longer, repeating the treatment from time to time. Quinine, 1-1000, for irrigation of the bowel also fails to kill the cysts. No case should be considered cured until several examinations fail to show the cysts. Salvarsan and neosalvarsan have been used with good effect in dysentery. G. M. Niles¹² used emetine in four cases; one of them relapsed after two months, and the others remained well up to ten, eleven, and twelve months respectively. He prefers the larger doses of 2 or 3 gr. recommended by Allan. He also advises bowel injections of 1 pint of pure kerosene oil daily for three or four days and retained for thirty to forty minutes, but has not seen amœbic dysentery cured by this alone.

A. G. Du Mez¹³ describes methods of obtaining emetine mercuric iodide and emetine bismuthous iodide respectively. They are insoluble in water and weak acid, and although they have not yet been tried in man, he thinks they will be rendered soluble by the alkaline juices in the intestine. The equivalent of 0.03 gram of emetine hydro-iodide did not cause vomiting in dogs, but large doses did so.

In a summary in his introduction he repeats the statement which has appeared in other American papers, to the effect that Rogers first used emetine in keratin-coated pills by the mouth, whereas he first gave the drug hypodermically on account of the frequent failure of full doses of ipecacuanha by the mouth, and afterwards gave it by the mouth to test its value under conditions not allowing of hypodermic injections.

A. J. Chalmers and R. G. Archibald¹⁴ write on the cure of amœbic dysentery. They confirm Rogers's observations on the frequent latency of the disease, and the occurrence of symptoms of diarrhœa, indigestion, and pain, with thickening in the right iliac fossa, simulating appendicitis, as the result of chronic amœbic infection. The difficulty is to know when the organisms have been completely eradicated from the system and the patient is really cured. They believe they have found the solution of this difficulty in the occurrence of a large mononuclear increase as long as amœbæ persist, and that by repeated differential leucocyte counts the necessary information can be obtained, emetine treatment being continued at intervals as long as the leucocyte count has not reverted to the normal.

W. L. Christie¹⁵ has found *E. histolytica* in 59 per cent of the inhabitants of Sarawak, Borneo, together with very numerous ova of worms.

Fresh infusion of **Chaparro Amargosa** given orally and per rectum with beneficial results (p. 10). **Kaolin** (p. 21).

REFERENCES.—¹*Amer. Jour. Trop. Dis.* 1914, Sept. 169; ²*Johns Hop. Hosp. Bull.* 1915, 45; ³*Amer. Jour. Trop. Dis.* 1915, Mar. 572; ⁴*Ind. Med. Gaz.* 1915, 11; ⁵*Amer. Jour. Trop. Dis.* 1914, Sept. 205; ⁶*Jour. Amer. Med. Assoc.* 1914, ii, 1806; ⁷*S. Afric. Med. Rec.* 1914, 339; ⁸*Boston Med. and Surg. Jour.* 1914, ii, 816; ⁹*Lancet*, 1915, i, 255; ¹⁰*Jour. Amer. Med. Assoc.* 1915, i, 982; ¹¹*Brit. Med. Jour.* 1914, ii, 1061; ¹²*Amer. Jour. Med. Sci.* 1914, Oct. 526; ¹³*Philadel. Jour. of Sci. Sec. B.* 1915, 73; ¹⁴*Jour. Trop. Med.* 1915, 181; ¹⁵*Brit. Med. Jour.* ii, 1915, 89.

AMPUTATIONS.

W. I. de C. Wheeler, F.R.C.S.I.

Owing to the frequency of 'ploughed' compound fractures accompanied by virulent sepsis, together with the various forms of spreading gangrene which result from shell wounds, amputations have acquired special significance at the present time. At the base and home hospitals a rigid conservatism is still practised with success, but there are numerous cases where the conditions and surroundings are such that orthodox methods must be abandoned.

Fitzmaurice Kelly¹ writes that it has long been recognized that in war surgery amputation flaps should be cut rather short, and in the present war the French surgeons soon found that it was better not to stitch them at all, but to pack gauze between the flaps. The method he advocates goes still farther. It consists in a simple circular division of all the tissues, including the bones, at the same level, and that level the lowest possible. The skin is divided by a circular sweep, the muscles are divided at the level to which the skin retracts, and the bone is then sawn at the same level. The bleeding points are secured

and tied, the nerves pulled down and cut short, and a dressing is then applied to the raw surface of the stump.

This operation is, as will be seen, very simple and very rapid in execution, and the results have been surprisingly good. The stump is not painful if care be taken to shorten the nerves, and there is very little shock. Most surprising of all, it can be performed at the margin of gangrenous tissue, without, apparently, any danger of the gangrene spreading to the stump; in one case of massive gangrene reaching the middle of the upper arm, amputation was performed half an inch from the gangrenous tissue, and the stump remained healthy. The acuteness of the case may be judged from the fact that the operation was performed within forty-eight hours of the infliction of the wound. And in cases of compound fracture of the femur, with the wounds in the groin and buttock and the fracture just below the trochanters, he has amputated below the wounds, enucleating the lower fragment and laying open the sinuses on to the surface, with complete success. Disarticulation at the hip-joint would in this case have proved fatal—indeed, no surgeon who saw the case would have attempted it.

To sum up, the advantages claimed for the method are: (1) Economy of tissue. The amputation is performed at the lowest level at which a flap could be cut, or even lower, and all recoverable tissue is thus preserved. (2) It is applicable to otherwise hopeless cases, such as wounds or gangrene at the root of the limbs, and in these cases carries a much better prognosis than disarticulation at the hip- or shoulder-joint. (3) It is very rapidly done, and there is very little shock. (4) The surface from which septic absorption can occur is the least possible, and the drainage is free. (5) The nutrition of the stump is unimpaired; in this respect its advantage over a flap amputation is obvious. (6) It is so simple that it is within the range of everyone, and does not need an experienced surgeon for its performance.

It has other advantages in special cases. One in particular, that presents itself not infrequently, is the case of multiple wounds. As an example, a case in one of the French hospitals may suffice. The patient was wounded by a shell which reduced the foot to pulp and sprinkled the whole limb with splinters to above the level of the knee. In this case it was urgent to remove the foot, and the presence of septic wounds in the leg made it impossible to obtain suitable flaps. The foot was removed by transverse section of all the tissues just above the ankle-joint, and the other wounds were treated by free drainage. The patient made a good recovery, with the loss of the foot only.

The chief disadvantage of the method is that a second operation—a re-amputation—is necessary. But this can be postponed until the infection of the wound has disappeared, and can be undertaken in conditions wholly favourable as to time and place, and should therefore be without danger. It is an inconvenience rather than a contra-indication.

Gordon Watson² describes a method of amputation of the foot

which, in his opinion, has provided more useful stumps than could have been obtained by Syme's or Pirogoff's amputations. The original walking surface of the heel remains intact, the malleoli are preserved, and the foot with the astragalus is removed in front of the os calcis. The os calcis is wedged between the malleoli and nailed in position. The operation was performed seven times successfully. The technique is as follows :—

1. *Excision of the Astragalus.*—A curved semilunar dorsal flap is cut, extending from half an inch below and behind the tip of the internal malleolus to a quarter of an inch below the tip of the external malleolus. The central point of the flap should be one and a half inches distal to the mid-point of a line joining the malleoli, and should cross the astragalo-scaphoid joint. This flap is dissected up to the level of the ankle-joint, the extensor tendons are divided, the anterior tibial vessels ligatured, and the anterior tibial and musculocutaneous nerves cut short. The ankle-joint is then opened from the front, and the foot is forcibly depressed (the equinus position in cases of talipes facilitates this stage of the operation). The internal lateral ligament is severed from its attachments to the astragalus, with the edge of the knife kept close to the bone, and the anterior and middle fasciculi of the external lateral ligament are similarly dealt with. With the foot held in an inverted position, the knife is passed from without inwards between the astragalus and the os calcis, dividing the interosseous ligament. The astragalo-scaphoid joint is next opened, and the head of the astragalus freed. The body of the astragalus is then seized with bone forceps, and twisted round so as to detach it from the posterior ligament of the ankle-joint and from the posterior fasciculus of the external lateral ligament.

2. *Removal of cartilage from the lower ends of the tibia and fibula and from the upper surface of the os calcis.*

With a broad gouge, the cartilage is removed from the upper articular surface of the ankle-joint, working from within outwards, so that the gouge is checked against the inner surface of the external

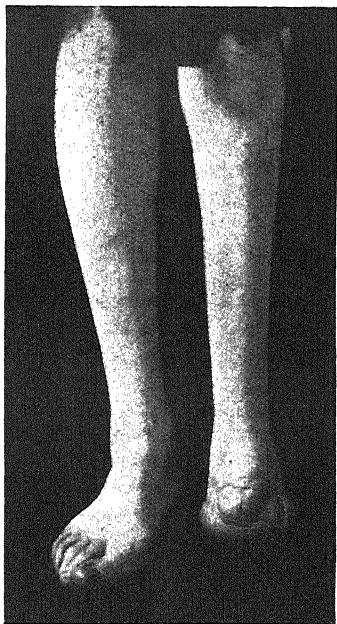


Fig. 4.—Amputation of the foot in a case of a man, age 30, with infantile hemiplegia with talipes equinovarus. Photograph taken three and a half years after operation. (By kind permission of the *British Journal of Surgery*.)

malleolus. The upper articular cartilage on the os calcis is removed with a gouge, chisel, or saw, the sustentaculum tali cut off with bone forceps, and the sinus pedis cleared of fibres of the interosseous ligament and extensor brevis digitorum. The tendo Achillis is then divided subcutaneously with a tenotome, together with any contracted fibrous tissue around it.

3. *Amputation of the Foot.*—Up to this point the foot has been left articulated to the os calcis for purposes of manipulation. A plantar skin-flap is cut, which commences at the extremities of the dorsal flap and extends along the lateral aspects of the foot to half an inch in front of the tubercle of the scaphoid on the inside, and half an inch in front of the prominence of the base of the fifth metatarsal on the outside, curving across the sole between these two points. The os calcis is then disarticulated from the cuboid, and the separation of the foot completed by cutting from behind forwards obliquely through the soft parts of the sole to the margins of the skin flap, keeping the knife as close to the bones as possible. Before fixing the os calcis to the tibia, the plantar vessels are tied, the plantar nerves cut short, and the anterior articular surface of the os calcis is removed. The os calcis is then wedged into the gap between the malleoli, and a six-inch steel excision pin is driven through the middle of the skin of the heel and through the os calcis into the centre of the shaft of the tibia. About two inches of the pin are left projecting from the stump.

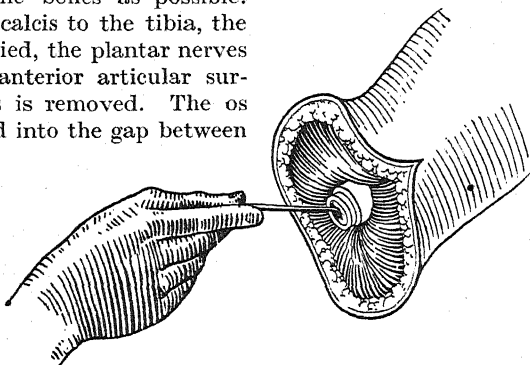


Fig. 5.—Aperiosteal amputation: spooning out the marrow (after Muller).

If any tension remains in the region of the tendo Achillis, further subcutaneous cutting may be necessary, but great care must be exercised to avoid injury to the posterior tibial vessels. The flaps are now sutured, and a small drainage tube is employed. The use of a tourniquet facilitates the operation, but if employed, care must be taken to avoid an accumulation of blood under the dorsal flap.

The drainage tube may be removed on the second day, and the excision pin on about the fourteenth. The stump should then be put into plaster for six weeks or so, to avoid any displacement backward of the os calcis before firm union has occurred. The patient is allowed to walk on a peg leg, taking purchase from the knee, as soon as the plaster has been applied.

Henry H. Lyle³ recommends aperiosteal amputations. He believes that the periosteum should be divided above the line of bone section

and the medullary cavity scooped out (*Fig. 5*). In this way the formation of irregular fragments of bone is prevented, and painless weight-bearing stumps result. This method is only second to the osteoplastic amputation such as Pirogoff recommended at the ankle-joint.

Telford¹ draws attention to the very important subject of the relation of amputation stumps and artificial limbs. Partial amputations of the foot through its hinder portion, e.g., Chopart's amputation, are not to be advised. The best appliance and, consequently, the best result, can be provided for in Syme's amputation. Efforts to save larger portions of the foot defeat their own object, and this fact acquires special significance at the present time in view of the likelihood of further severe cases of frost-bite. Seven inches below the knee is an excellent site for amputation when considering the future application of the artificial limb. The sloping sides of the stump are capable of bearing the weight of the patient against the stump socket, but in the fitting care must be taken of the prominent head of the fibula. Flexure contraction of the knee-joint must be carefully avoided. It is very difficult to fashion a limb to a backward-tilted stump unless it is made short by amputating only about two inches below the joint. Amputations through the knee-joint give, as a whole, excellent weight-bearing results.

"Amputations through the femur at a point higher than the condyle can, of course, bear no weight on the face of the stump. Here the weight has to be carried mainly by the pelvis, assisted to a slight extent by the sloping sides of the stump. The object in these amputations should be to secure as long a stump as possible for the sake of the leverage so obtained. The shorter thigh stumps give a poor hold, and, owing to their soft and fatty tendency, are not easy to fit. Very useful limbs can be fitted to the hip-joint amputation. In these cases the soft stump is fitted with a strong and accurately-shaped socket, attached firmly by a pelvic band or by shoulder-straps, and to this socket the artificial limb is fixed by lateral hinged joints, the socket retaining its exact apposition to the pelvis during the movements of walking and sitting."

REFERENCES.—¹*Lancet*, 1915, i, 15; ²*Brit. Jour. Surg.* 1915, Jan. 390; ³*Jour. Amer. Med. Assoc.* 1914, ii, 1149; ⁴*Med. Chron.* 1915, Aug. 249.

ANÆMIA.

Herbert French, M.D., F.R.C.P.

Aubertin¹ divides all anæmias broadly, not into primary and secondary as is usual, but into *globular* and *hæmoglobic* anæmias. Globular anæmias are characterized by a reduction of the red cells without great change in their hæmoglobin content; hæmoglobic anæmias by a reduction in the hæmoglobin contained by each red cell—it may be only half the normal, or less,—without any great fall in the total number of red cells. **Iron** and **Arsenic** benefit each of these types of anæmia differently. Iron excites the formation of new red cells; arsenic the production of hæmoglobin and its fixation within the red

cells. In certain cases in which the blood defect exists in a pure form, arsenic or iron alone will, he holds, cure the anæmia completely ; but in many cases that are both globular and hæmoglobic, both these drugs need to be given. He believes that there are numbers of cases of severe anæmia in which arsenic causes a remarkable rise in the numbers of red cells, but fails to raise the hæmoglobin to the same extent ; it is then necessary to add iron to the arsenic treatment. Generally speaking, he finds it preferable to employ the two drugs, not simultaneously, but successively, starting with arsenic if the blood-count shows anæmia mainly of the hæmoglobic type, with iron if of the globular type ; and then alternating with the other drug after a period.

REFERENCE.—*Presse Méd.* 1914, 381.

ANÆMIA, PERNICIOUS. (*See also LEUKÆMIA and SPLENIC ANÆMIA.*)

Herbert French, M.D., F.R.C.P.

Stern¹ insists, as others have done, that pernicious anæmia is only the late stage of a malady which may some day be recognized much earlier ; though as yet we are unfamiliar with symptoms likely to suggest the diagnosis before the blood-count has become typical. He believes that periodic soreness, burning, and ulceration of the mouth, gums, and fauces is an almost constant symptom of the disease in its earliest phases, and quotes cases to illustrate this belief.

Williams² draws attention to the fact that, besides the familiar gross lesions in the peripheral nerves and spinal cord that pernicious anæmia may give rise to, it sometimes causes sufficient alteration in the brain cells to produce mental symptoms of an insanity type ; and this not necessarily in the terminal stages of the malady only, but even comparatively early. He gives notes of two cases which had to be certified on account of troubles of this kind. Both patients were typical examples of pernicious anæmia ; in addition to the general symptoms, they suffered from ideas of persecution, leading to periodic outbursts of violence ; confusion of ideas, with loss of orientation as regards place and time ; yet with good general intellect. Exaggerated knee-jerks and extensor plantar reflexes indicated gross degenerations in the spinal cord, such as frequently result from severe anæmia, and Williams surmises that the serious psychoses were due to analogous changes in the brain cells.

TREATMENT.—Byrom Bramwell³ was the originator of the treatment of pernicious anæmia by arsenic ; it is therefore particularly valuable to have his views upon the relative efficiency of **Fowler's Solution** and of **Salvarsan**, based upon 21 cases treated with salvarsan or neosalvarsan, and 110 cases in which he gave Fowler's solution. He is convinced of the superiority of the salvarsan treatment ; he considers original salvarsan to be considerably more beneficial than neosalvarsan, and prefers giving the drug by intramuscular injection to administering it intravenously.

Of the 110 cases treated by arsenic given by the mouth in the form

of Fowler's solution, in 36 cases (32·7 per cent) there was no improvement; in 22 (20 per cent) there was slight improvement; in 40 (34·5 per cent) there was marked improvement; and in 14 (12·7 per cent) there was complete temporary recovery.

Of the 21 cases treated by salvarsan or neosalvarsan, in 6 (28·5 per cent) there was no improvement; in 3 (14·2 per cent) there was slight improvement; in 5 (23·8 per cent) there was marked improvement; and in 7 (33·3 per cent) there was complete temporary recovery.

Arsenic by the Mouth.—Of the 110 cases treated by arsenic in 12 cases (10·9 per cent) the ultimate result is not known; in 4 (3·6 per cent) the patients remain fairly well; in 2 (1·8 per cent) the patients remain quite well; in 92 (83·6 per cent) the patients have died.

Salvarsan and Neosalvarsan.—Of the 21 cases treated by salvarsan or neosalvarsan, in 1 case (4·7 per cent) the patient remains fairly well; in 5 cases (23·8 per cent) quite well; in 15 (71·4 per cent) the patients have died. None of the deaths were directly due to salvarsan.

Gossage⁴ records four cases of pernicious anæmia treated by neosalvarsan (0·3 gram) injected intramuscularly into the buttock after a local injection of novocain. There was little pain after the injection. All the cases improved for a time, one of them very markedly, the red cells rising from 1,600,000 to 4,110,000 per c.mm. In no case, however, did the blood-picture become entirely normal, even at the height of the improvement. Neosalvarsan treatment is, therefore, ameliorative rather than curative, though it is more beneficial than Fowler's solution.

Splenectomy for pernicious anæmia is finding further advocates. It was tried in one of Gossage's cases, but only in an advanced stage of the disease, the patient dying a few hours later. Two fresh cases treated in this way are reported by Roblee,⁵ in each of which the improvement after the operation was rapid and pronounced. In one case, in spite of medical treatment, the patient was in what seemed like his last relapse, with 1,500,000 red corpuscles per c.mm., confined entirely to bed for the preceding five weeks, despondent and prepared to die; yet on the fourteenth day after splenectomy he walked downstairs by himself, and a fortnight later had 4,000,000 red corpuscles per c.mm. Splenectomy may not cure the disease permanently, but the improvement after the operation may be striking and immediate, so that even as a mere palliative it needs to be carefully considered. The spleen need not be enlarged for the operation to be indicated.

Minot⁶ reports a case of pernicious anæmia in which, after three months of medicinal treatment without improvement, splenectomy was resorted to with noteworthy benefit; the improvement in the anæmia is shown in the chart on page 88.

Investigations were carried out upon the nitrogenous excretion of the patient before and after splenectomy; and the net conclusions were that, whereas before the operation less than 50 per cent of the

urine nitrogen was in the form of urea, afterwards the urea nitrogen rose to 79.6 per cent of the total nitrogen, which is practically normal. Urobilin disappeared from the urine at the same time; and the deduction drawn from these facts is that splenectomy had led to the liver performing its functions much more normally than before the operation, as though splenectomy had resulted in a cessation of supply of toxic substances from the spleen to the liver.

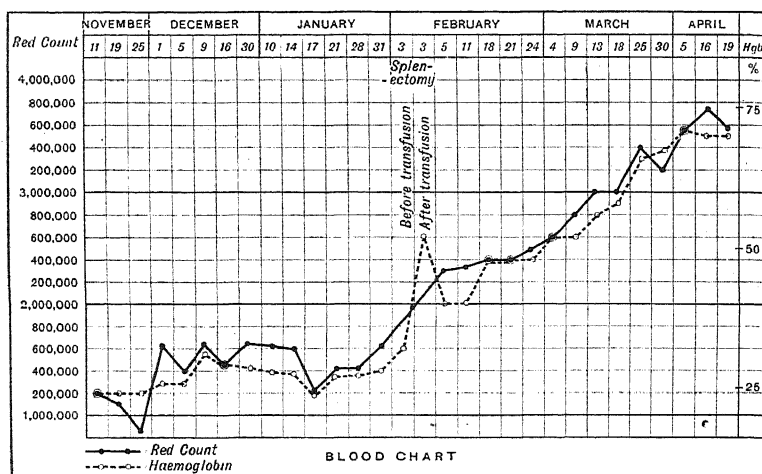


Fig. 6.—Pernicious anemia: chart showing improvement after splenectomy.

Marked symptomatic relief said to be achieved by **Blood Transfusion** (p. 9). **X-ray** treatment recommended (p. 57).

REFERENCES.—¹*Deut. med. Woch.* 1914, 1517; ²*Jour. Amer. Med. Assoc.* 1914, ii, 936; ³*Brit. Med. Jour.* 1915, i, 406; ⁴*Med. Chron.* 1915, Apr. 1; ⁵*Surg. Gyn. and Obst.* 1914, ii, 675; ⁶*Johns Hop. Hosp. Bull.* 1914, 538.

ANÆSTHETICS.

J. Blumfeld, M.D.

Anæsthesia in Labour.—Very much has been written of late, especially in America and on the Continent, in support of scopolamine-morphine narcosis in the conduct of midwifery cases. Moreover, the subject has been exploited in the lay press to such an extent that practitioners are assailed on all sides by a demand for 'twilight-sleep,' without those who demand it understanding at all exactly what it is they desire, or whether it is to their advantage that it should be granted to them. Obviously, then, it is worth while for all medical men who practise midwifery to make themselves conversant with this comparatively novel form of anæsthesia. A comprehensive article on the subject, with a full bibliography, may be found in the *Old Dominion Journal*.¹ The earlier objections to the process, which were founded upon impurity of the scopolamine used and upon the frequently deplorable condition of the newly-born infant, have

been to a large extent discounted by the advent of fuller knowledge of the pharmacology and physiological action of the drugs employed.² At the present time, indeed, the chief obstacle to a very wide use of the method lies in the enormous tax that it involves upon the time and attention of the medical attendant, and upon the difficulty of successfully conducting the procedure outside the walls of an institution. Upon the former point, all those who have had experience of the method are agreed, and the more emphatically so the more experienced that they are.^{3, 4} The tendency to disintegration of scopolamine has been met by the addition to it of mannite.²

The extent to which the presence of the practitioner is necessitated may be estimated by the brief directions for the conduct of a case laid down in one of the articles referred to.² (1) "When the uterus is contracting so as to cause a 'pain' about every five minutes, give a hypodermic injection of scopolamine $\frac{1}{100}$ gr. and narcophine gr. $\frac{1}{2}$; (2) One hour later give $\frac{1}{100}$ gr. scopolamine ; (3) After the memory test has been applied, half an hour later repeat this injection if necessary ; (4) Later injections of scopolamine are to be given at from one to one and a half hour intervals according to the depth of twilight sleep produced." When the patient is restless or does not sleep between pains, more narcophine may be allowed in addition. The injections are to be given intramuscularly in the gluteal region. When delivery is expected within about an hour, no more injections are to be made, for fear of serious damage to the respiration of the infant. Primiparæ require on an average five or six injections ; as many as eighteen to twenty have been given within twenty-four hours. The writer of this article² believes that the method is safe both for mother and child, but that constant observation is necessary. Out of much written matter upon the subject we have found only one article in strong opposition.⁵ The writer here states that 20 per cent of the patients are rendered delirious by the injections. Those in favour of the method claim that it reduces infant mortality, lessens the need for operative interference, reduces the frequency of lacerations, and above all abolishes in the minds of women who experience it all fear of the pains of childbirth. The special field for its use appears to be in the case of nervous primiparæ. (*See also* LABOUR, DIFFICULT.)

Akin to the 'twilight-sleep' method, but by no means to be recommended, is the use of large doses of morphia in labour cases, which has suffered an attempted revival at certain hands in France. Under a veil of secrecy the injection was highly extolled, but the whole matter has been brought into the light of truth and the proceeding condemned by responsible obstetricians in that country.⁶

Another method of anæsthesia in confinement cases, which is also distinguished by the amount of attention required from the medical man responsible for the anæsthetic, depends upon the employment of nitrous oxide as the anæsthetic agent. The many advantages inherent in nitrous oxide, as contrasted with the toxic general anæsthetics, are of course obvious, and it is now claimed⁷ that a technique

has been evolved which makes the use of the gas perfectly applicable to cases of labour. The writer gives the following classification of the effects that may be desired and produced: (1) Analgesia; individual pain application; the patient holding the inhaler. (2) Analgesia; individual pain application; an attendant holding the inhaler. (3) Analgesia; continuous application; the patient holding the inhaler. (4) Analgesia; continuous application; an attendant holding the inhaler. (5) Anæsthesia, light but complete narcosis; individual pain application; the patient holding the inhaler. (6) Anæsthesia; individual pain application; an attendant holding the inhaler. (7) Anæsthesia; continuous application.

The author depends entirely upon air, not upon oxygen, for diluting the nitrous oxide, and the apparatus provides for the regulation of the quantity of air mixed with the gas and for the regulation of rebreathing. He says that in normal labour the presence of an anæsthetist is unnecessary, self-application by the patient being safe and easily accomplished. In analgesia, nitrous oxide is mixed with air to the extent of 20 to 50 per cent of the latter. The inhaler is placed upon the nose. The statements of some of those who advocate the use of nitrous oxide in labour are difficult to reconcile with ordinary experience. Thus it is said that although pure nitrous oxide or an admixture of oxygen so low as 3 per cent may be used to produce anæsthesia, yet no jactitations are called forth.⁸

Nitrous Oxide Anæsthesia.—The use of 'gas' in obstetrics is only one of the evidences of the favour with which this agent is regarded in the United States. Much work has been done, both purely clinical and experimental, in order to extend to the widest range the possibility of employing this, the least dangerous of general anæsthetics. The work which Hewitt in Great Britain long ago did in connection with percentage mixtures of oxygen and nitrous oxide has been amplified.⁹ Thus Connell claims to have worked at zones of anæsthesia corresponding to various percentages of oxygen, from 3 per cent oxygen and 97 per cent nitrous oxide, which he calls the lethal zone, up to a mixture of 50 per cent of the two gases, which he calls the zone of conscious analgesia. The 'medium zone' of 8 per cent oxygen should be used for induction, and the 'light zone' with 11 per cent oxygen for abdominal surgery, whilst for surface surgery the 'very light' of 14 per cent oxygen is employed. The author candidly states that in resistant subjects no relaxation is to be obtained with nitrous oxide as the sole anæsthetic; this must be supplemented by ether. Two gallons a minute is the average rate at which he finds nitrous oxide has to be employed. He finds that unsupplemented nitrous oxide and oxygen anæsthesia is ineffective to block the centripetal stimuli of operative trauma, which is in interesting contrast to the findings of other American writers, who have declared nitrous oxide, on experimental grounds, to be the most protective to the cerebral matter of all anæsthetics. This writer's conclusion is that nitrous oxide anæsthesia, even when it is efficiently supplemented, possesses

no practical advantage over properly induced and maintained ether anæsthesia. Concerning the inability of the above form of anæsthesia to provide muscular relaxation, it is interesting to note that Gotch, discussing the proper depth of narcosis, holds that shock is mainly caused by muscular relaxation, and therefore not only does not aim at securing this state of the muscles, but definitely avoids doing so. In abdominal cases he prefers to let the patient almost come round whilst an anastomosis, for instance, is being carried out, and when the peritoneum is closed gives no further anæsthetic.

Combined Method of Anæsthesia.—As an instance of this, we may take the case of a patient, a highly nervous woman, with active tuberculous disease in both lungs and an early carcinoma of the cervix. The surgeon wishes to perform a radical extirpation by the Wertheim method, and will require at least from one and a half to two hours' working anæsthesia. An inhalation of ether for such a length of time is out of the question in view of the pulmonary condition, and even chloroform given to the extent required might well have a fatal result. Prolonged nitrous oxide and oxygen are extremely unlikely to afford the muscular relaxation necessary throughout. With her nervous system quieted by morphia and scopolamine, her secretions reduced by atropine, shock diminished and muscles relaxed by intraspinal injection of stovaine, and psychic disturbance eliminated by the abolition of consciousness throughout by minimal inhalations of chloroform, the patient passes with comparatively little disturbance through a formidable operation to a placid recovery. In such a case, which is not a mere hypothesis, the Trendelenburg position will be employed, a great additional aid in avoiding shock, and this will be borne in mind in selecting a suitable fluid for the spinal injection.

Surgical Shock is a subject which continues to give occasion for much speculation and many suggestions, both as to its nature and how best to treat the condition. Crile's deductions from the presence of chromatolysis in the cerebral cortex are forcibly denounced by Pike,¹⁰ who points out that all the reflex effects involving skeletal muscles are abolished in surgical anæsthesia; therefore the cortical cells are inexcitable in this condition and the chromatolysis can bear no causative relation to the shock; similarly there is inexcitability of the cortex of the cerebellum and complete absence of the reflex phenomena attributable to the cerebellum, such as tone of the extensor muscles of the limbs, yet chromatolysis occurs in the cerebellar cells also.

The treatment of post-operative shock is discussed by Lieb,¹¹ who is of opinion that the only effective measure is prevention. Most of the commonly employed remedies are useless. The only reasonable proceeding is to use morphia to shield the central nervous system, and local anæsthetics at the periphery, i.e., about the wound, in order to isolate the source of centripetal painful impulses. According to this observer, although we know little or nothing of the nature of shock, yet we have learned the direct exciting cause. Shock is always

due to afferent impulses—impulses which may arise at the periphery or within the central nervous system itself. On this foundation must the treatment of shock be built.

Acidosis.—That condition of the blood which is present in severe cases of so-called 'delayed chloroform poisoning' affords a problem for clinicians and physiologists which cannot yet be regarded as satisfactorily solved. Least of all do we completely understand what the relationship is between the blood state and the anæsthetic which is regarded, very likely incorrectly, as being its cause. Crile, in a recent article,¹² states that when the liver and the suprarenals are overtaxed, and the alkalies and bases are exhausted, the state of acidosis is reached. Such an overtaxed condition may well accompany the combination of operative shock and anæsthetic toxæmia. Regarding hydrogen-ion concentration of the blood as an index of its acidity, Crile had experimental investigations made as to the power of operative stimuli and various anæsthetics to increase this acidity. He draws some definite indications as to practice from the result of these investigations, viz.: (1) Increased acidity develops during the anæsthesia itself; (2) Morphia preceding the induction of anæsthesia lessens the production of acidity; but given after acidity has been produced, this drug lessens the power of the animal to overcome acidity. Patients in whom acidosis is present or threatened should be treated with pre-operative administration of sodium bicarbonate and glucose, and of bromides per rectum. Other indications are to use local anæsthetics and gentle manipulation, so as to spare the general anæsthetic as much as possible, to operate as rapidly as possible, and to avoid worry, fear, and injury, since these factors also produce increased acidity.

Oil-ether Colonic Anæsthesia.—One more recent development of rectal anæsthesia is detailed by Gwathmey.¹³ The mixtures used are: for adults, olive oil 2 oz., ether 6 oz.; and for children, olive oil and ether in equal proportions. It is given 1 oz. per minute, and the catheter is introduced 4 in. within the rectum twenty minutes before operation. One ounce of the mixture is used for every 20 lb. of body weight, and more than 8 oz. should never be given. Preliminary treatment consists of a dose of castor oil the night before operation, followed in the morning by warm-water enemata until the return is clear. One hour before operation, 5 to 20 gr. chloretone are given in half an ounce of equal parts of oil and ether. Half an hour before operation, a hypodermic of morphia and atropine is given. By using paraldehyde as the preliminary, the necessary amount of oil-ether mixture is reduced by one-half.

If the lid-reflex goes or stertor or cyanosis appear, two or three ounces of the mixture are to be withdrawn from the colon. If narcosis is too light, a towel is placed over the nose and mouth, so as to limit elimination and diminish air-supply, presumably.

Others¹⁴ have slightly altered Gwathmey's technique, by dispensing with the preliminary medication per rectum. Ether is to be detected

in the patient's breath a few minutes after beginning the rectal injection. If the discomfort of rectal manipulations is disregarded, the method offers considerable advantages in head and neck operations. It is claimed for this procedure that the amount of mucous secretion, and of nausea and vomiting, is greatly diminished.

Ether—'Open' and 'Closed.'—The wide favour in which 'open' ether is held is not altogether justified, according to those who follow Yandell Henderson in his theories of shock causation. In a recent article,¹⁵ this writer and J. Bryant discuss various baneful effects of forced breathing and acapnia, which are often produced, they hold, with the use of 'open' ether. The conclusions arrived at are in favour of wider use of 'closed' rebreathing methods of administration. The authors state: (1) The same general facts and the same character of direct evidence which have established rebreathing as a proper and beneficial adjunct of nitrous oxide in general anæsthesia, demonstrate the advantages of rebreathing and the use of closed methods in the administration of ether. (2) Many of the special advantages claimed for nitrous oxide as compared with ether are probably due to the fact that the former is now generally administered by rebreathing methods, and the latter by open methods, rather than to the particular qualities of the anæsthetics themselves. (3) Evidence is here adduced to show that to a very great extent the depression of the circulation and respiration, and the post-operative nausea, vomiting, intestinal paresis, and gas pains incidental to etherization are the results of acapnia. (4) On this account we urge the adoption of closed and rebreathing methods, preliminary administration of morphine and atropine, and avoidance of fear and excitement. (5) The principal point of this paper is that by observing the colour of the skin it is possible to estimate the condition of the circulation. Pallor under ether usually indicates a circulation depressed because of acapnia and needing to be restored and maintained by more rebreathing and conservation of the body's store of carbon dioxide. Excess of rebreathing and deficiency of oxygen are indicated by a cyanotic tint. The rule for the anæsthetist is: keep the patient pink.

Treatment of Threatened Fatality during Narcosis.—The physiology of dangerous states arising during anæsthesia and their appropriate treatment is well handled by Embley.¹⁶ His main recommendations, which will approve themselves to all experienced anæsthetists, are prompt lowering of the patient's head and performance of artificial respiration.

Sal Volatile inhalation of value as a respiratory stimulant at various stages of general anæsthesia (p. 2). **Quinine and Urea Hydrochloride** as local anæsthetic (p. 27).

REFERENCES.—¹*Old Dominion Jour. Med. and Surg.* xx, No. 5; ²*Med. Rec.* 1915, i, 599; ³*N. Y. State Jour. Med.* xv, 146; ⁴*Amer. Jour. Obst.* 1915, i, 721; ⁵*Ibid.* 1914, ii, 621; ⁶*Presse Méd.* 1914, 709; ⁷*Amer. Jour. Surg. (Supplement)*, 1915, July, 109; ⁸*Jour. Amer. Med. Assoc.* lxiiv, 512; ⁹*Amer. Jour. Surg. (Supplement)*, 1915, i, 28; ¹⁰*Ibid.* 1914, ii, 109; ¹¹*Ibid.* 1915, i, 65; ¹²*Ann. Surg.* 1915, i, 6; ¹³*Amer. Jour. Surg.* 1915, i, 184; ¹⁴*Surg. Gyn. and Obst.* 1915, i, 553; ¹⁵*Jour. Amer. Med. Assoc.* 1915, ii, 1; ¹⁶*Amer. Jour. Surg. (Supplement)*, 1915, April, 69.

W. I. de C. Wheeler, F.R.C.S.I.

Anoci-Association.—The efficacy of nerve-blocking with a local anæsthetic to prevent nocuous afferent stimuli reaching the brain centres during an operation under general anæsthesia is no longer in doubt. Certain propositions, however, present themselves to the practical surgeon. In the first instance, the method is not sufficiently appreciated at present to encourage specialization in the administration of local anæsthetics, and thus the surgeon before operation is often burdened with a tedious and lengthy task. Secondly, thorough nerve-blocking is uncertain in many major operations if the patient is under the influence of a general anæsthetic, and it is doubtful whether there is any benefit to the patient from an incomplete procedure. The administration of **Omnopon** and **Scopolamine** in order to eliminate the nocuous stimuli produced by mental and psychical phenomena before an operation is advantageous and does away with the necessity for a general anæsthetic. The patient, although oblivious of his surroundings, is sufficiently conscious to appreciate and resent pain, and the surgeon is thus made aware if the nerve-blocking is incomplete. Crile uses nitrous oxide as the general anæsthetic even for prolonged operations. It seems better, however, to abandon general anæsthetics and rely on **omnopon** and **scopolamine** to meet the psychical considerations of anoci-association. There is no doubt that the strain on the surgeon is greater, and 'local anæsthetists' are needed to popularize a practice which is theoretically sound and gives gratifying and striking results when properly carried out.

It is not difficult to anæsthetize locally all the layers of the abdominal wall, including peritoneum, with **Novocain**, before any incision is made, and the relaxation of the muscles which results leaves nothing to be desired. The peritoneum becomes quite insensitive if injections are made deeply under the aponeurotic layers of the abdominal wall.

Pannett,¹ from an experimental study, discusses the advantages of locally anæsthetizing the abdominal wall prior to laparotomy, and arrives at the following conclusions. Afferent impulses set up by incision of the abdominal wall in the linea alba can be prevented from reaching the nerve centres by local infiltration with **novocain**, as recommended by Crile. When the incision is not in the middle line, these impulses can be blocked only by anæsthetizing the nerve trunks as well as employing local infiltration to render the nerve endings insensitive. This procedure may necessitate the waiting of some minutes between the injection of the anæsthetic and the severance of each layer. If perineural injections are employed, 1 per cent **novocain** must be used. Afferent impulses resulting from manipulation of the viscera have in general a more pronounced effect upon the vasomotor centre than those resulting from the opening of the abdomen and the retraction of the edges of the wound. To bring about a condition of anoci-association of the nerve centres, it is as essential to cut off impulses ascending from the viscera as it is to block those coming from the abdominal wall. Afferent impulses set up by manipula-

tion of the stomach, intestine, and the attachments of these viscera, may be blocked by local anæsthetization of these attachments. The tone of the abdominal muscles is increased by the manipulation of the viscera or by dragging upon the parietal peritoneum. This reflex rigidity can be eliminated by locally anæsthetizing the abdominal wall and by blocking impulses from the viscera.

REFERENCE.—¹*Brit. Jour. Surg.* 1914, Oct. 248.

ANEURYSM.

Carey Coombs, M.D., M.R.C.P.

ETIOLOGY.—A point which might have medico-legal importance, as the authors point out, is raised by Morgan and Teacher,¹ who record five examples of aortic aneurysm arising in connection with ulcerative endocarditis, presumably as a consequence of embolic infection of the aortic wall. The patients' ages range from 14 to 36. In two of the sacs, all of which were small and arose from the root of the aorta, evidences of repair were detected. In one case the sac had burst into the pericardium, causing death.

SYMPTOMS.—E. H. Goodman² records four cases which emphasize the importance of abdominal aneurysm as a possible cause of left-sided abdominal pain. It is not necessarily associated with erosion of the vertebræ, though the sac usually lies posterior to the trunk of the aorta. The pain is boring in character, intermittent or remittent, and referred particularly to the region lying between the lower ribs and the crest of the ilium. In cases exhibiting this symptom without other obvious cause, the possibility of an aneurysm should be recollected and a skiagraphic examination instituted.

DIAGNOSIS.—Under the title of 'phantom aneurysms' West³ describes cases in which the signs of aneurysm—pulsating tumour with thrill and bruit, dilatation of veins and inequality of pulses—have been noted during transient periods in the peripheral arteries (axillary, innominate, carotid, and once in the thoracic aorta), subsequently disappearing altogether. The explanation is obscure. A somewhat similar phenomenon is the throbbing abdominal aorta sometimes noted in nervous persons.

REFERENCES.—¹*Brit. Med. Jour.* 1914, ii, 715; ²*Med. Rec.* 1914, ii, 587; ³*Lancet*, 1915, ii, 533.

ANGINA PECTORIS.

Papaverine recommended on pharmacological grounds (*p.* 24).

ANGIOCHOLITIS.

Buxus Sempervirens (*p.* 10) in tincture form said to be useful.

ANGIOMATA.

W. I. de C. Wheeler, F.R.C.S.I.

Francis Reder,¹ in a comprehensive paper dealing with the various theories of the origin of angiomas, points out *inter alia* that capillary angiomas often follow the distribution of the three divisions of the fifth cranial nerve. He deals more particularly with cavernous angiomas, and their treatment by **Injection of Boiling Water** is strongly advocated. In a series of twenty-six cases, there were no failures,

in every instance the results being very gratifying. Most of these cases presented the lesion upon the face and scalp. Four patients had angiomas upon the tongue, ranging from the size of a filbert to that of an English walnut. One patient presented the lesion upon the left gluteal region, as large as a cocoanut, and another patient, a young man of eighteen years, had a fusiform angiomatous growth upon the right middle finger, between the second phalangeal articulation and the knuckle.

Operations designed to ligature off all the feeding blood-vessels are often impracticable. Electricity and cauterization are frequently ineffectual, and the injection of alcohol and preparations of iron have proved disappointing. This new procedure is a simple one. It is astonishing how little pain is experienced after the injection, which is done under ether or nitrous-oxide anæsthesia. Small children begin to play soon after the effects of the anæsthesia have passed off, disregarding the increased swelling caused by the boiling-water injection.

The dangers of this method are sloughing of the tissues with resultant infection, injury to neighbouring organs such as the eye, and embolism. By careful technique these dangers can be avoided, and though it is right to call attention to them, they are not of sufficient moment to discourage the method. Reder describes application of the treatment as follows:—"The introduction of the needle and the force applied in injecting the hot water are of great importance. Inasmuch as the weak tissues of the new growth do not offer the resistance of normal skin which overlies the angioma, the hot water, if used without great care, may cause these tissues to break down. Injections made directly into the enlarged capillaries are invariably followed by a necrosis. For this reason it is well to make the initial injections through the sound skin about $\frac{1}{16}$ and $\frac{1}{8}$ in. from the edge of the angioma, well beneath the neoplasm, thus assuring coagulation of the deeper parent vessels. This is also a wise precaution against the dangers of embolism.

"If the arteries leading into the tumour can be demonstrated, it is well to enter the needle along their course and inject a sufficient amount of boiling water to cause coagulation in these vessels.

"Judgement should be exercised, in introducing the needle, to prevent the point from resting too near the opposite wall of the tumour. To estimate this procedure properly, it is well first to introduce the needle without the syringe, pushing it through the mass till it can be felt on the opposite side, then withdrawing it to the extent of half an inch. This will give a reasonable assurance that the boiling water can be injected into the tumour without the probability of sloughing. When the skin begins to turn greyish in colour, the injection into that area is to be discontinued. Hyperdistention must be carefully guarded against. The amount of hot water necessary to cause this bleaching rests wholly with the extent of tissue under treatment. After coagulation of this particular area has been satisfactorily accomplished, the point of the needle is made to penetrate

into another area and the hot water injected. In this manner the needle is introduced into the tumour in different places, always from side to side, and at various angles, until the whole mass gives evidence of coagulation.

"The quantity of hot water which may be injected at one sitting can be as much as three or four ounces in a tumour the size of a hen's egg, the time consumed being about ten minutes. However, if the new growth is of unusual size, it would be advisable to inject only a portion of the tumour at one time, making a subsequent injection two or three weeks later.

"Angiomata under treatment with hot water must be scrutinized closely, and the areas that have not been affected must be dealt with. In this manner a tumour the size of an orange may require two to four injections, the time for a cure being two to five months."

REFERENCE.—*Surg. Gyn. and Obst.* 1915, ii, 161.

ANKYLOSTOMIASIS.

Sir Leonard Rogers, M.D., F.R.C.P.

A. E. A. Ismail¹ discusses the circulatory changes and hæmic murmurs in ankylostomiasis.

C. M. Fauntleroy² describes the methods of examining immigrants for ankylostomiasis at Honolulu. For deodorizing the faeces 20 per cent formalin is used. About 2 grams of faeces are mixed with 2 per cent lysol and centrifuged, the supernatant liquid being decanted, and the process repeated three times, when the sediment is microscopied after adding a small drop of aniline gentian-violet, which leaves the ova unstained and standing out clearly. Thymol was used for expelling the worms.

TREATMENT.—P. Harper³ writes on the prevention and treatment of ankylostomiasis in Fiji among 2000 indentured Indian immigrants in a swampy area where the excessive death-rate was largely due to the disease. By improving the sanitation, especially as regards latrines, frequent inspection of the coolies for early signs of disease, and prompt treatment by **Thymol**, the death-rate fell in one year from 36.7 to 19.46 per thousand in adults, and from 137.7 to 116.0 in children. On one estate boots were issued to the coolies, but they could not be persuaded to use them regularly.

C. E. F. Mouat-Biggs⁴ advises the use of a spoonful of milk of **Higueron** (*Ficus laurifolia*) on three consecutive days. R. L. Levy⁵ reports on the use of **Oil of Chenopodium**, this drug having come into prominence because of the great rise in price of thymol owing to the war. He finds that the treatment had no ill effects and was more effective than thymol, while it is many times cheaper, costing only about twelve shillings a pound. He tabulates and discusses reported cases of poisoning by this drug, and shows that very excessive doses were taken. After several hours, symptoms of nausea, vomiting, abdominal pain, and headache appeared, followed by drowsiness, deafness, and tinnitus aurium, and sometimes ataxia and coma. In administering the drug for ankylostomiasis, on the first day liquid diet and

1 oz. of Epsom salts should be given, and repeated the next morning at 5 a.m. At 7, 9, and 11 o'clock 16 drops of the oil on a teaspoonful of granulated sugar are given, and at 1 p.m. 1 oz. of castor oil with 50 min. of chloroform, to remove the worms. The treatment may be continued weekly until no ova can be found in the stools.

V. G. Heiser⁶ discusses recent experiences of the treatment with **Oil of Chenopodium**, and quotes a total of over 100,000 cases thus treated with great success and no danger, while it is also one of the best drugs against round-worms, tape-worms, and whip-worms. In Singapore it was given in 10-min. doses on three successive mornings before breakfast, with castor oil two hours after the last dose. In Sumatra 40,000 cases were treated, with an efficiency of 91 per cent, against 83 per cent with thymol; 16 min. on sugar, divided into three doses, were given at hourly intervals, followed after two hours by 17 grams of castor oil and 3 grams of chloroform. (*See also p. 12.*)

C. Lane⁷ writes on the treatment of ankylostomiasis for the benefit of tea-garden doctors, and reviews the different forms of treatment, discussing their efficiency and cost. Although thymol and chenopodium gave rather better results than β -naphthol, at the present time the last is much the cheapest. W. B. Orme⁸ records two cases in which fatal results followed the use of β -naphthol in ankylostomiasis, but in each albumin was present in the urine before the drug was given, and should have been regarded as prohibiting its use. When full doses are given, the treatment should not be left to subordinates without very careful control.

REFERENCES.—¹*Lancet*, 1915, i, 1175; ²*Amer. Jour. Trop. Dis.* 1915, May, 703; ³*Lancet*, 1914, ii, 740; ⁴*Trans. Soc. Trop. Med.* 1915, June, 216; ⁵*Jour. Amer. Med. Assoc.* 1914, ii, 1946; ⁶*Ibid.* 1915, ii, 526; ⁷*Ind. Med. Gaz.* 1915, 241; ⁸*Ibid.* 207.

ANOCI-ASSOCIATION. (*See ANÆSTHESIA.*)

APPENDIX VERMIFORMIS, DISEASES OF.

E. Wyllys Andrews, M.D., F.A.C.S. (Chicago).

Barrett¹ reports twenty appendectomies for *chronic appendicitis in children*. This disease and tuberculous peritonitis he classes as the two most common diseases of childhood. The last 200 laparotomies at the Children's Hospital, Dublin, showed 37 instances of acute and chronic appendicitis, and 19 of tuberculous peritonitis; also 17 for intussusception, but the number of operations for tuberculous peritonitis does not represent the total number of such cases. Appendicitis is a frequent disease of childhood, and should be diagnosed at an early period, before the onset of symptoms of suppuration. Many of these cases are carelessly diagnosed as gastritis from the mere presence of abdominal pain. In reality, gastritis is rare in childhood. A cerebral tumour is the only other likely cause of persistent vomiting in children. Even pain after eating in childhood is an important sign of appendicitis, due to peristalsis of the inflamed appendix. Clogg reported last year 54 cases of operation for appendicitis in

children during the quiescent stage, and 45 for cases showing local or general peritonitis. The statistics of Gray, of Aberdeen, are similar. Out of his series of 200 cases, 126 had complications, such as perforation, gangrene, or peritonitis. These figures should be reversed. The disease in children should be operated upon early, as in adults. When the diagnosis is made, appendectomy should be performed as a routine treatment. Chronic appendicitis in a child is a source of pain, danger, and ill-health, and when it goes to suppuration, it is attended by high mortality.

Neill,² of Baltimore, reports on *Cullen's method of exposing the appendix*, a simple way of removing an adherent retrocaecal appendix through the ordinary gridiron incision. This has been practised in their clinic for the last seven or eight years. In nearly every case the base of the appendix can be located by following the longitudinal band on the cæcum. When this is located, a blunt forceps is pushed through the meso-appendix, and a piece of tape passed round it. Strong traction is exerted without any injury either to cæcum or appendix. This invariably brings up $\frac{3}{4}$ in. of the appendix. Another piece of tape is then used as a tractor, and a further portion of the

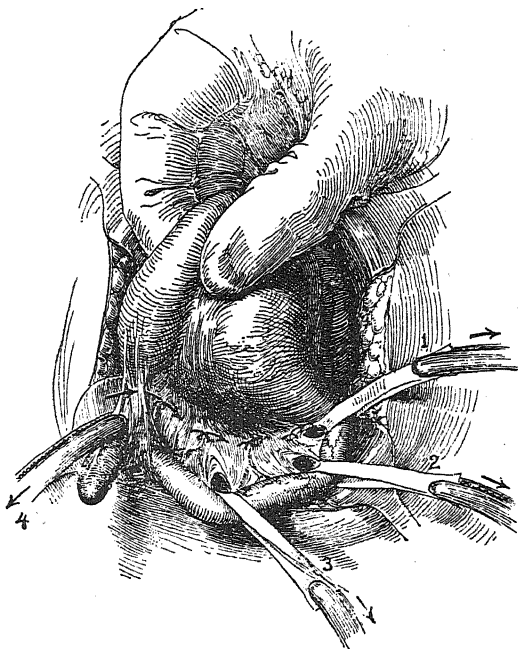


Fig. 7.—The meso-appendix is clamped on its cæcal side and cut as indicated by the arrows. Note that the tapes produce an equable and broad traction, and that they do not injure the appendix. By this method a long, adherent retro-caecal appendix can be removed readily through an ordinary gridiron incision.—Reproduced from the *Journal of the American Medical Association*.

appendix is exposed. This is repeated through a series of openings with several pieces of tape until the tip of the appendix is reached, when the meso-appendix can be clamped off, as indicated in Fig. 7.

Newbolt³ discusses *appendicitis in the elderly*, meaning those from sixty years upward. He describes cases in which with general abdominal infection patients grew weaker and died, after which an autopsy showed appendicitis with cellulitis extending up behind the peritoneum or in some obscure location. These cases are uncommon, but are exceedingly difficult of diagnosis during life. The writer

found notes of four such instances out of four or five hundred cases occurring in the Liverpool clinic. Some of these had been diagnosed as intestinal obstruction, and the symptoms disguised by morphia until too late for operative interference. He also describes cases in women of abdominal infection without general abdominal rigidity, the trouble appearing in the pelvis. In one such case the appendix was found in the Douglas pouch, perforated and gangrenous, and after operation the patient made a good recovery. Another similar case occurred in a male, who had only pelvic disturbance, but no soreness or pain at McBurney's point. Newbolt asks the question, Can these cases be diagnosed? and thinks that this is not always possible, especially when first seen after four or five days of illness.

Irvin⁴ declares that fifteen hundred people die annually in England and Wales from appendicitis unnecessarily, and thinks that such a problem demands vigorous investigation. Moynihan's picturesque words, "the pathology of the living," have failed to receive due consideration. All acute diseases of the appendix have been included under the term appendicitis, but the writer shows that only those of the obstructive type threaten life. In a series of experiments made on cats, Wilkie, of Edinburgh, proved that the presence of faecal contents in an obstructed loop of bowel leads to the distention of the loop with pus, followed by gangrene and perforation. The writer thinks the same thing is true of the inflamed appendix, and therefore insists on early interference in so treacherous a disease. The death-rate cannot but be high if perforation of the obstructed appendix be allowed to occur. The first and most important factor in the success of operation is its early performance. Give us these cases, he insists, before perforation occurs, and therefore before pus develops, and we shall get rid for ever of our ghastly figures for appendix operations. After reporting a series of thirty-five cases, Irvin states that appendicitis may be divided into two types: acute appendicitis and acute appendicular obstruction. To the latter belong most of the tragedies of abdominal surgery. "Lastly, what of the third day in acute diseases of the appendix? Let us blot it out altogether and rename it the first day . . . after operation."

Wilkie⁵ insists that when we find patients suffering from acute appendicitis, no matter what other symptoms are present, the diseased organ is responsible. Some years ago it was customary for the surgeon to have to deal with the secondary effects of appendicitis. It is now understood that we may have an acute inflammation without much rise of pulse or temperature, and yet it has become necessary to recognize it in the earliest possible stage. Wilkie also desires to separate symptoms of appendicitis from those of acute appendicular obstruction. It is the latter only which causes dangerous complications. The causes of this obstruction are fibrous stenosis of the appendix, with plugging of the constriction; also acute kinking of the appendix and diffuse swellings of its walls, encroaching on the

PLATE V.

ACUTE APPENDICULAR OBSTRUCTION



Fig. A.—Isolated loop of ileum of cat; removed by operation three weeks after the primary operation. Mucocoele of loop.

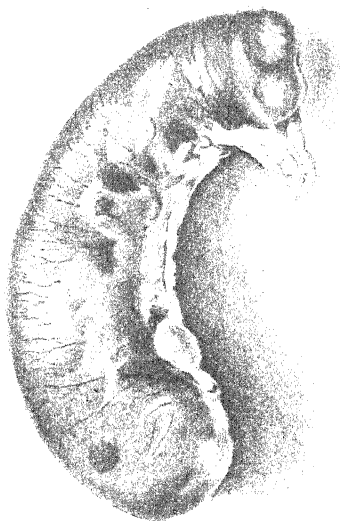


Fig. B.—Empyema of loop; three days after isolation; partly filled with caecal content after carbohydrate diet.

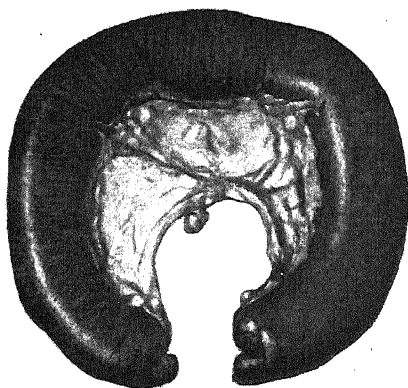
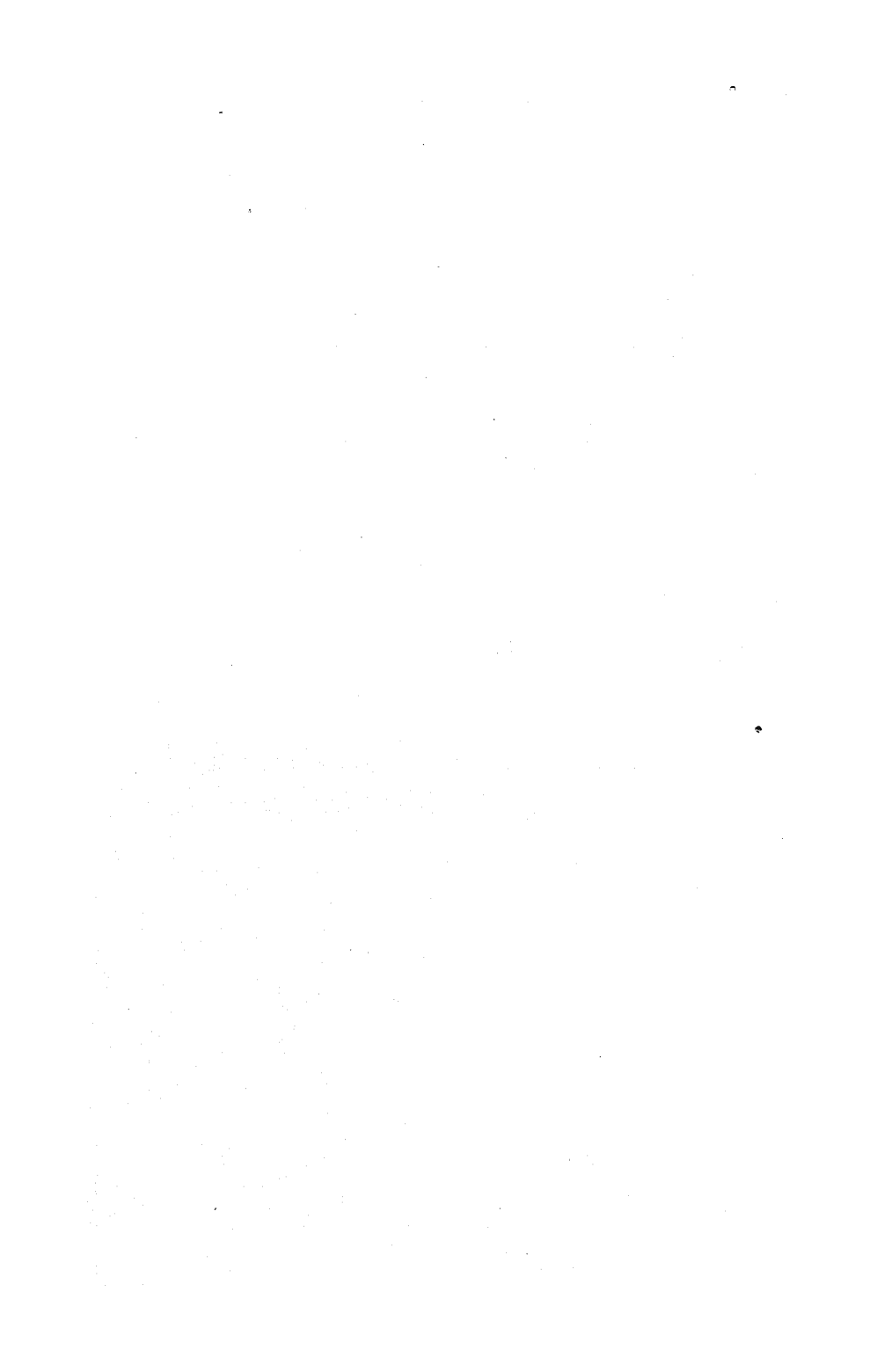


Fig. C.—Gangrene of loop; twenty-four hours after isolation; filled with caecal content, after protein feeding.



Fig. D.—Mucocoele of human appendix.

Drawings kindly lent by Dr. D. P. D. Wilkie



lumen. The results of obstruction were studied experimentally by isolating a portion of the bowel, such as the appendix, under various conditions as regards contents. These experiments were on cats, on the terminal portion of the ileum, which contains a large amount of lymphoid tissue in its wall. These animal experiments showed conclusively that all the changes seen in appendicitis could be brought about by artificially obstructing the lumen when filled with different septic materials. (*See Plate V.*)

Page⁶ discusses the treatment of certain cases of *appendicular abscess*. All surgical statistics support the common conviction that operative interference at any time in the first forty-eight hours is the right line to adopt. The same view is taken of the late stage, but cases continue to come under the care of the surgeon for the first time late in the third day of the disease, and it is in relation to the treatment of this class that the writer offers certain criticisms. At St. Thomas's Hospital it has been customary to operate on cases of localized appendicitis at any stage of the disease. The appendix is removed, if possible, without too great disturbance. If the inflammatory mass involves the anterior parietal peritoneum, the results are good, and complications seldom ensue. If the general peritoneum has not been shut off, a spreading peritonitis is liable to ensue, causing death from peritonitis, or possibly residual abscess. In order to avoid this, two procedures are advocated. First, that practised at St. Thomas's and advised by Murphy and others, carefully to pack off the surrounding peritoneal cavity with gauze pads, deal with the infected focus, and sponge out the abscess; then to remove the pads and close the incision except for drains to the infected area. The other technique is to lay open the abdominal wall freely, pack it completely with gauze, and leave the abdominal wound open. Other less common methods are various extraperitoneal routes, as that of Sonnenberg, in his classical monograph, who advises drainage via the pericolic cellular tissue in the loin, the peritoneum being stripped away from the anterior and lateral walls. The St. Thomas's Hospital statistics from 1909 to 1913 are shown in the accompanying table, also those from other institutions by comparison:—

APPENDIX ABSCESS, ST. THOMAS'S HOSPITAL,
1909-13.

	Cases	Deaths
1909 ..	66	6
1910 ..	91	4
1911 ..	71	6
1912 ..	81	2
1913 ..	50	7
Total ..	359	25 = 6.9 per cent

That this death-rate is not above the average is shown by the following figures, taken from various sources :—

Source	Cases	Deaths	Mortality
			per cent.
Burgess, <i>Brit. Med. Jour.</i> , 1912, p. 415 ..	107*	2	1·86
Fromme, <i>Zeit. f. Chir.</i> , 1912, cxix, 562	106†	8	7·59
Krogius, <i>Arch. f. klin. Chir.</i> , 1911, Bd. 95, p. 759	32	1	3·1
McWilliams, <i>Med. and Surg. Rep.</i> , 1912, Presby. Hosp. N.Y., p. 445	120	26	18·0
Merkens, <i>Zeit. f. Chir.</i> , 1911 ..	60	14	23·3
Mutch, <i>Guy's Hosp. Rep.</i> , 1910 ..	97	10	10·0
Richardson, <i>Brit. Med. Jour.</i> , 1912 ..	180	18	10·0
Vick, <i>St. Bart's Hosp. Rep.</i> , 1912 ..	299	12	4·0
	27	2	7·4

* Appendix removed.

† Appendix not removed.

The cause of death in the cases quoted from *St. Thomas's Hospital Reports* is given as follows : General peritonitis 17, intestinal obstruction 4, portal pyæmia 3, erysipelas 1.

In the reports of 1911–13 particulars are given of the method of operation in the fatal cases, to the effect that of the 12 cases dying from general peritonitis in those years the abscess was opened across the peritoneum in 10. This, says Page, proves, as far as figures can, that the technique he has described for the treatment of abscesses not adherent to the anterior abdominal wall is unsatisfactory. To emphasize this, he quotes the figures given in the 1912 report, which show that these cases treated in this way, when not fatal, have a higher incidence of complications and a long convalescence.

In 12 cases out of a total for the year of 81, the abscess, though well localized, was not adherent to the anterior abdominal wall. Ten of these cases suffered from residual abscess formation ; the other 2, as already stated, died.

X-ray diagnosis of chronic appendicitis discussed on p. 51.

REFERENCES.—¹*Med. Press and Circ.* 1915, Apr. 21 ; ²*Jour. Amer. Med. Assoc.* 1915, i, 299 ; ³*Liverp. Med.-Chir. Jour.* 1915, 131 ; ⁴*Brit. Med. Jour.* 1915, i, 581 ; ⁵*Ibid.* 1914, ii, 259 ; ⁶*Ibid.* 832.

ARRHYTHMIA. (*See* PULSE, IRREGULAR.)

ARTERIES, DISEASES OF. (*See also* ANEURYSM ; BLOOD-PRESSURE.)
Carey Coombs, M.D., M.R.C.P.

Functional Diseases.—Under this heading Sir Lauder Brunton¹ refers to the throbbing abdominal aorta of the neurotic woman, and to similar phenomena in other arteries, and ascribes them to loss of tone in vasomotor nerves. Similar throbbing is noted in Graves's disease. Another vasodilator neurosis is morbid blushing, a disorder

common in women at the climacteric, and in young people of nervous temperament. To such it may be a positive disability. On the other hand, there are many conditions which appear to originate in vasoconstriction. Among these he mentions migraine, Raynaud's disease, as well as some cases of angina pectoris, and of the similar abdominal pains with which certain people are afflicted.

Various therapeutic hints terminate the paper. Among them is his testimony to the value of rectal administration of drugs in cases of migraine where vomiting makes the oral route impracticable. In chilblain circulation, Raynaud's disease, and migraine, he has found **Sodium Salicylate** with **Potassium Bromide** useful, also **Thyroid Extract** in small doses.

Thrombo-angiitis Obliterans.—Buerger² brings forward evidence collected from 200 cases of this disease seen by him (for full description see *MEDICAL ANNUAL*, 1910, p. 162) to show that certain neuroses and trophic disturbances, which are not associated with any lesion whatever of the vessels supplying the parts, may be perfectly simulated by the symptoms of thrombo-angiitis obliterans in its various stages. For example, there may be any or all of the symptoms of Raynaud's disease in its different stages: gangrene, slight or widespread, of the affected extremity; extensive atrophy of the hand and forearm; and scleroderma and sclerodactyly. For the clinician the moral is that, in all cases of the kind, a diagnosis that implies absence of organic disease should not be decided upon until the most vigorous search has been made for evidences of arterial obstruction. (*See also* PSEUDO-ERYTHROMELALGIA.)

Any representative review of arterial disease, as considered in current medical literature, must include a note of Sir Thomas Clifford Allbutt's book³ on *Arterial Disease and Angina Pectoris*. In this he has embodied his well-known views as to the evolution of these lesions, illustrating them with a wealth of clinical detail.

REFERENCES.—¹*Lancet*, 1915, ii, 161; ²*Amer. Jour. Med. Sci.* 1915, i, 210; ³London: Macmillan & Co. 1915.

ARTERIES, SURGERY OF.

W. I. de C. Wheeler, F.R.C.S.I.

Osler¹ discusses *arteriovenous aneurysm* and comments on its rarity. The changes that follow are: (1) The blood-current is reversed to a certain extent in the veins; (2) The blood-pressure is increased in them; (3) Their walls become arterialized; and (4) The blood-pressure in the artery is heightened on the proximal and lowered on the distal side of the lesion.

In lesions of the vessels of the neck and arms the venous stasis is much less than in the legs, in which the effect of gravitation is so felt that year by year the changes become more pronounced until large varicosities and sacculi are formed. Femoral and popliteal arteriovenous aneurysms may last for years without great involvement of the veins, but in a majority of cases venous stasis forms the most serious sequel of the disorder. Osler remarks, after describing and

illustrating several cases, that there are three great physical signs of arteriovenous aneurysm—the dilatation of the veins, the thrill, and the murmur. Other minor features may be mentioned, such as absence or lessening of pulsation, the influence of posture on venous engorgement, the pulsation in the peripheral distended veins, the frequency with which phleboliths and thrombi may be felt.

The possibilities are as follow: (1) Non-intervention may be followed by good results. Aneurysms in the upper extremities are more favourably situated than in the lower. (2) Spontaneous healing may occur, the orifice closing between the artery and the vein; but this is exceedingly rare. (3) Sudden death may occur from heart failure or embolism; (4) Rupture with fatal hæmorrhage may occur. (5) The patient may be disabled by varicose veins and thrombosis. (6) The vascular tissue involved may take on a varied growth.

Osler agrees "that arteriovenous aneurysms should be **Operated upon**, as they offer small prospect of spontaneous cure, although they often remain stationary for a long time and cause relatively little trouble." It is largely a question of situation and technique.

Heuston, of Dublin (unpublished), operated upon an officer in June, 1915, with a well-marked arteriovenous aneurysm in Hunter's canal, the result of a bullet wound. To control hæmorrhage it was found necessary to tie both artery and vein above and below the lesion. The immediate result was satisfactory, with apparently no disturbance to the arterial and venous circulation of the limb.

Bullet wounds of the calf may produce secondary hæmorrhage or be followed by diffuse or localized traumatic aneurysm, in which it is difficult to decide whether the anterior or posterior tibial artery is the vessel at fault. The following case illustrating the condition is described by the writer, and was successfully dealt with by ligature of the popliteal artery in the lower third of the thigh²:—

"On October 18, three weeks after he had received the wound, the patient was seized with intense pain in the leg, and it was found that the calf on both sides had swollen considerably, and great pulsation could be felt over a wide area on the inner side. The pulsation extended almost from the knee to the middle of the leg. On the following morning blood commenced to ooze from the internal exit wound, and it was seen that active surgical intervention had become necessary. We were confronted with several problems: First, notwithstanding the pulsation on the inner side of the leg, it was impossible to say whether the anterior tibial or posterior tibial, or both arteries, had been injured by the bullet; secondly, if it was the posterior tibial artery, as seemed most likely, the injury was too high up to ligature this vessel by the usual route; thirdly, ligature of the posterior tibial artery below the popliteus muscle at or near the origin of the peroneal branch artery might have proved ineffective or useless, especially when it was uncertain if the anterior tibial artery had been wounded. In the circumstances it was decided to tie the popliteal

artery in the lower third of the thigh. The incision was made in this position behind the tendon of the adductor magnus muscle. It was not difficult to expose the artery surrounded by fatty tissue behind the femur, but great care had to be exercised to separate the vein which lay in the depths of the wound covering the artery in this operation. A double No. 4 silk ligature was passed round the artery and secured. The exit wound at the inner and upper portion of the leg was enlarged, and the fingers passed into a cavity without definite walls and about the size of a tennis ball, containing blood-clot. There was direct communication between this cavity and the point of entrance through the interosseous membrane. The fibula had been grazed by the bullet. A large tube was now passed from the inner wound through the interosseous membrane and out through a small incision which corresponded to the point of entrance of the bullet. The septic wound was dressed, as is our custom, with pads saturated with eusol. The collateral circulation was completely established on the day of operation, and four days later an artery as large as the radial was pulsating in relation to the inner side of the knee-joint.

"It may be of interest to note that only twelve cases of aneurysm of the posterior tibial artery have appeared in the literature since 1894, and that where the bullet takes a course such as I have mentioned, Dupuytren's difficulties should be remembered. In connection with a case of hæmorrhage from the calf caused by a pistol bullet, this old writer says: 'Should a ligature be tied on the ends of the divided vessels? But what were those vessels? Was it the anterior or posterior tibial? or the peroneal or popliteal? Was it several of them at the same time? Should they be attacked from before or behind?'

"These problems which arose in the practice of men of bygone days when sepsis and secondary hæmorrhage were rife, are reappearing daily as a result of the war. From the brief account of this case it will be recognized that the Matas operation was impossible, for there was no sac; ligature of the posterior tibial artery was not practicable, and it was doubtful whether the anterior tibial artery was wounded or not. The fear of the first few days was the likelihood of recurrent hæmorrhage owing to the rapid development of the collateral circulation."

Turner³ describes a case of circumscribed *traumatic aneurysm of the posterior tibial artery*. A tourniquet was applied and an incision made directly over the swelling. The sac was opened, but the feeding vessels could not be identified. There was a hole in the tibia which admitted the forefinger with ease. What were thought to be the ends of the posterior tibial artery were tied, and the cavity was packed with gauze. The tourniquet was released and the gauze removed. There was immediately a swish from some large vessel, with very considerable hæmorrhage. The tourniquet was reapplied, and the femoral artery was ligatured in Hunter's canal. The hæmorrhage was still

alarming and seemed uncontrollable. Turner considered that the bleeding vessel must either have been an exceptionally large nutrient artery to the tibia or that the anterior tibial artery had been wounded. Packing of the hole in the tibia with strips of gauze soaked in turpentine eventually checked the bleeding. The effects of the loss of blood were very marked, but the patient completely recovered. The freedom of the collateral circulation was a revelation in this case.

McGlannon⁴ reports two cases of aneurysm of the posterior tibial artery, and comments on the fact that only nine cases have been mentioned in the literature since 1894.

In the first case a tourniquet was applied and the sac exposed through an incision along the middle of the back of the leg. The fusiform sac was opened throughout its length, and the upper and lower openings of the artery were sutured with fine silk. The sac was next obliterated by several layers of catgut sutures; the muscles were united, and the wound was closed without drainage. Six months after operation, dry gangrene developed in the toes and extended as far as the tarso-metatarsal joints. The author does not consider the gangrene consequent to the operation, but the result of general arteriosclerosis and the natural development of his previously existing arterial disease.

In the second case a fusiform aneurysm of the upper portion of the posterior tibial artery was excised, and after the ligaturé of several vessels the wound was closed with drainage. For eight weeks there was marked œdema, which afterwards gradually disappeared.

McGlannon sums up in favour of the former method of operation, not only because of its greater ease of accomplishment, but also because it gave better immediate and remote results.

Stetten⁵ writes on the futility of *arteriovenous anastomosis* in the treatment of impending gangrene of the lower extremity. A series of experiments was conducted on limbs amputated for gangrene in patients suffering from arteriosclerosis. An emulsion of red oxide of lead in paraffin oil (equal parts) was injected into the veins with a pressure equal to a high blood-pressure, and the results were studied by *x-ray* photographs. In an exhaustive article, Stetten arrives at the following conclusions: (1) That the arterial circulation to the periphery, even in very advanced arterial disease, is in every respect better and easier than the retrograde venous circulation, mainly because of the obstruction offered by the valves and the short-circuiting of the blood through anastomoses of neighbouring venous collaterals; (2) That the operation is dangerous, and the results have been most unsatisfactory, except in a very small percentage of cases; (3) That the few so-called successful results have probably been obtained more in spite of than because of the operation, inasmuch as various factors play a rôle in the improvement of these cases, as improvement has been recorded after definite closure of the anastomosis, and as failure has occurred with perfect patency of the arterio-venous fistula; (4) That even if the anastomosis functionates, which it rarely does, there is no possibility of circulatory improvement, but

rather quite the reverse; (5) That the term 'reversal of the circulation,' at least as far as clinical cases are concerned, is absurd; (6) That even if the usefulness of the operation were proved beyond question, the possible indications would be restricted to an unappreciable minimum.

Considerable success has been obtained by the employment of Colt's apparatus for the **Wiring** of cases of *aneurysm of the abdominal aorta*. The writer⁶ recorded three cases successfully treated by this method. One patient operated upon in August, 1910, for aneurysm of the celiac axis, is alive and well five years afterwards. A second case was seen nine months after operation and was apparently well; a third died of rupture of the sac secondary to intestinal obstruction a few days after introduction of the wire.

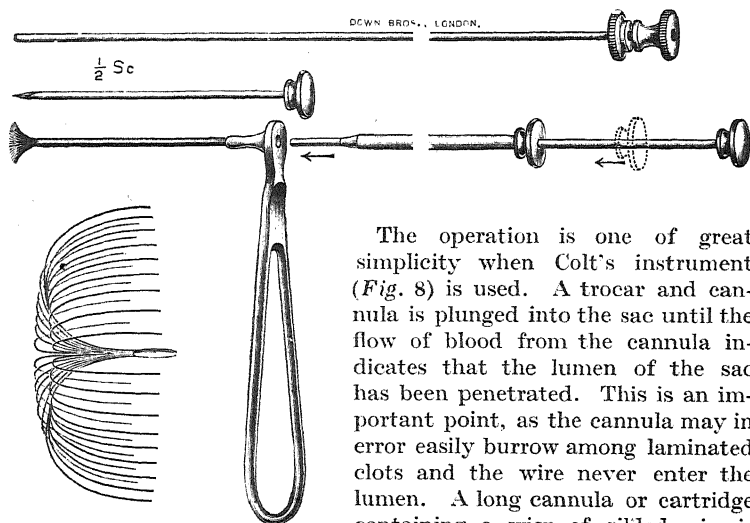


Fig. 8.—Colt's apparatus for wiring aneurysm of the abdominal aorta.

The operation is one of great simplicity when Colt's instrument (Fig. 8) is used. A trocar and cannula is plunged into the sac until the flow of blood from the cannula indicates that the lumen of the sac has been penetrated. This is an important point, as the cannula may in error easily burrow among laminated clots and the wire never enter the lumen. A long cannula or cartridge containing a wisp of gilded wire is applied to the mouth of the cannula already in position, and the wire is

pushed into the sac by means of a piston or ramrod. The wisps of wire are in various sizes, and the wire is so tempered that it expands into an umbrella-shaped instrument when not contained within the cartridge. (Fig. 8.) The most prominent symptom of abdominal aneurysm is pain in the back, due probably to the gradual stretching and rhythmical tugging of the posterior parietal peritoneum. If the patient be placed in the Mayo Robson gall-bladder position the operation is facilitated by the bringing of the aneurysm nearer the surface.

REFERENCES.—¹*Lancet*, 1915, i, 949; ²*Med. Press and Circ.* 1915, ii, 438; ³*Brit. Jour. Surg.* 1915, Oct. 284; ⁴*Jour. Amer. Med. Assoc.* 1914, ii, 1448; ⁵*Surg. Gyn. and Obst.* 1915, ii, 381; ⁶*Brit. Med. Jour.* 1914, ii, 835.

ASTHMA.

Lewis A. Conner, M.D.

The view that regards bronchial asthma as, at least in many cases, a manifestation of *anaphylaxis*, receives considerable support from the interesting work of Talbot,¹ who studied 11 cases of egg poisoning in children. Schloss, in 1912, had demonstrated that this was a phenomenon of anaphylaxis or allergy, and, in the case of a child showing this idiosyncrasy, was able to produce an immunity by the prolonged administration, by mouth, of minute doses of ovomucoid. He also devised a test for the detection of susceptibility to egg-albumin by applying egg-white (albumen) to the scarified skin. Among Talbot's 11 cases there were 6 which, in addition to the more usual symptoms of egg-poisoning (vomiting, diarrhoea, urticaria, eczema), had attacks of asthma. He was able to demonstrate that the paroxysms of asthma bore a definite relation to the ingestion of egg in all of these. In the five cases in which the skin test of Schloss was used this gave a positive reaction to albumen. By the administration of minute doses of **Albumen** he was able to produce an immunity, and a cure of the asthma, in three cases. In a fourth case some improvement had resulted and the process of immunization was being continued. In two cases he was not able to bring about immunization, as even very tiny doses of albumen produced symptoms of poisoning; but in one of these the boy could be kept free from asthma as long as he received no egg in his food.

The technique of the skin test, as given by Talbot, is as follows :—
(1) In patients giving the history that egg was poisonous to them, the skin of the flexor surface of the arm was cleansed with soap and water and alcohol, and then egg rubbed into the unbroken skin. Very sensitive individuals reacted within five to fifteen minutes, an urticarial wheal appearing at the place of application. The severity of the reaction was measured by the size of the wheal. (2) In less sensitive cases the skin was cleaned as above and then scarified, either by making a linear incision about three-quarters of an inch long, or by making a round puncture in the manner described by von Pirquet. Care should be taken merely to break the skin and to draw as little blood as possible. The white of a fresh egg was then rubbed gently into one scarification, while a second one was left for a control. A positive reaction is shown by an urticarial wheal at the site of application. It is not wise to do more than one test at the first visit if there is a quick and pronounced reaction, because enough egg may be absorbed to cause an attack of asthma. At a later visit the skin may be tested with dilution of egg-albumin to determine how sensitive the patient is.

Talbot emphasizes the fact that sensitiveness to egg-albumin is by no means the only cause of asthma in children. Hay fever, or anaphylaxis to the pollen of flowers, was a complicating factor in some cases; horse asthma in one case; and still another was complicated by anaphylaxis to beef-juice.

Babcock² also accepts the view that asthma is usually a manifes-

tation of anaphylaxis, but seeks the exciting cause in the absorption of foreign (bacterial) protein from some focus of suppuration such as chronic ethmoiditis, tooth abscesses, etc. If it is not possible to remove such a focus, he advises the use of autogenous **Vaccines** made from the discharge. He cites a case of severe asthma associated with chronic bronchitis which was cured by the use of a mixed vaccine made from the bacteria found in the bronchial secretion.

Andrews³ discusses the indications for, and the technique of, Freund's operation of **Chondrectomy** in the rigid dilatation of the thorax so often seen in old cases of emphysema and bronchial asthma. He believes that the operation has, in properly selected cases, a distinct field of usefulness.

Normal Serum may cure attacks of asthma provoked by neighbourhood to horses (p. 31). See also p. 38.

REFERENCES.—¹*Boston Med. and Surg. Jour.* 1914, clxxi, 708; ²*Jour. Amer. Med. Assoc.* 1915, lxiv, 2215; ³*Ibid.* 1914, lxiii, 1065.

AUDITORY NERVE, DISEASE OF. J. S. Fraser, M.B., F.R.C.S.

Tumours.—Schmiegelow¹ of Copenhagen states that tumours of the acoustic nerve present a well-marked clinical picture, which with the aid of modern diagnostic methods can be recognized so early that the surgeon has only to deal with a small growth.

Before 1903 cases of auditory nerve tumour were regarded as inoperable, but in that year Krause pointed out a route by which it was possible to get at the posterior and inner part of the petrous portion of the temporal bone (para-cerebellar route). The majority of cases are still operated upon by this method. The dura of the posterior cranial fossa is widely exposed on the side of the tumour, and may be divided at the time of the original operation or eight days later. The cerebellum is now pushed towards the middle line with a retractor, to give access to the region of the internal auditory meatus. As the distance to the internal meatus varies from 6.5 cm. (children) to 10 cm. (adults), this route is long and difficult. Great pressure has to be exerted on the cerebellum and also on the pons and medulla, and for this reason the sudden collapse of the patient, or difficulties with the respiration and heart action, take place and incline the surgeon to break off the operation. The mortality was as high as 81 per cent, and even in favourable cases was 70 per cent. It is little wonder that surgeons looked about for another route, and in 1904 Panse proposed that the tumours should be removed through the middle ear and labyrinth. In healthy people the tympanum and mastoid antrum are sterile, so that there ought to be no danger of post-operative meningitis. As the labyrinth is functionally dead in cases of cerebello-pontine angle tumour, one need have no hesitation in removing it. The only objection to the translabyrinthine route is the facial nerve, which in many cases is already destroyed by the tumour. If, however, the nerve be healthy, it can be entirely exposed throughout its course in the petrous bone and turned to one side, though this procedure greatly lengthens the

operation and adds to its difficulty. In order to remove tumours of the acoustic nerve, it is necessary to obtain space reaching in front to the carotid canal, below to the jugular bulb, behind to the sigmoid sinus, and above to the temporosphenoidal lobe. The danger of injuring the carotid is small, as this vessel runs in a canal which one can break open without difficulty in the removal of the petrous pyramid. Bleeding from the sigmoid sinus can be stopped by plugging. After removal of the pyramid, one raises the dura of the temporosphenoidal lobe and splits the dura beneath the superior petrosal sinus, and thus completely exposes the cerebello-pontine angle tumour.

Quix, of Utrecht, in 1911, was the first to remove a tumour of the acoustic nerve by the translabyrinthine route.

Schmiegelow states that as yet there have been no deaths in the cases in which the translabyrinthine route has been adopted, but he admits that only four cases have hitherto been operated on in this way. The method has a great advantage in that one works extradurally the whole time until the very end of the operation. Hæmorrhage also is much less, though it may be so severe as to necessitate stopping the operation. Still, conditions are better than in the paracerebellar method, where one is working between the cerebellum and the dura. In the paracerebellar operation one often cannot see the tumour at all, and must therefore trust to palpation, as it is not safe to exert too much pressure on the brain, at any rate in the posterior fossa. On the other hand, in the translabyrinthine operation one is freely able to retract the dura of the middle cranial fossa without any danger to the patient. Schmiegelow thinks that if a tumour cannot be removed by the translabyrinthine route it cannot be removed by the paracerebellar one. It is manifestly important to operate as early as possible. With regard to the technique, he admits that the translabyrinthine route is the more difficult, especially for the general surgeon who is not accustomed to the topography of the parts. Even if the tumour turns out to be an infiltrating one, the patient is not in a worse position if one performs what perforce has to be only an exploratory operation by the translabyrinthine route. In conclusion, the author remarks that the adoption of the translabyrinthine method does not prejudice a subsequent paracerebellar operation. On the other hand, the translabyrinthine is the only method which one can adopt with success in a case of true tumour of the acoustic nerve originating within the internal auditory meatus.

Salvarsan and the Inner Ear.—Botella² has observed, among eighty-one cases of syphilis treated with salvarsan, fourteen with more or less severe lesions of the nervous apparatus of the ear. He holds that these may be due to the following causes: (1) Jahrisch-Herxheimer reaction; (2) Neuro-recurrence; (3) Aggravation of an existing defect by the injection; (4) Arsenical neuritis. He is not in favour of injecting '606' in cases of recent affection of the acoustic nerve.

REFERENCES.—*Zeits. f. Ohrenheilk.* Bd. lxxiii, 1; ²*Arch. Internat. de Laryngol.* xxxv, parts 1 and 3.

AURICULAR FIBRILLATION.*Carey Coombs, M.D., M.R.C.P.*

The emergence of auricular fibrillation, as a definite and clear-cut syndrome, from the confused medley of cardiac arrhythmias, has given it, and the graphic methods by which it was first studied, rather more emphasis than it deserves clinically. That this is being recognized is shown by one or two American contributions during the past year. Schoonmaker¹ points out that it is possible to recognize the presence of auricular fibrillation without recourse to the polygraph or to the electrocardiogram—instruments which are not always accessible—in 90 per cent of cases. "An arrhythmia in which there is no regularity, no sequence, with the heart-rate above one hundred, being uninfluenced by treatment, together with the positive or ventricular venous pulse, as seen in the neck, is almost surely due to auricular fibrillation."

Pardee² gives details of seven cases which support his contention that the prognosis in auricular fibrillation is not always so grave as it would appear. If treatment be continuous, instead of being cut off as soon as it has overcome the symptoms of acute cardiac failure for which it is nearly always instituted at first, recurrences of those symptoms are likely to be prevented. The patient should be held under the influence of *Digitalis* given in such quantity as to keep the heart beating at about 70 per minute. [Pardee's cases illustrate not only the value of digitalis, but also the importance of the condition of the left ventricle, in the prognosis of auricular fibrillation. To a diseased, overworked ventricle, the irregular, rapid stimulation of auricular fibrillation may well prove the last straw. But if the ventricle be capable of good work, and the rate of stimulation be controlled by digitalis, a much better prospect lies before the patient. —C. C.]

REFERENCES.—¹*Med. Rec.* 1915, i, 505; ²*Jour. Amer. Med. Assoc.* 1915, i, 2057.

BACILLUS COLI INFECTIONS IN CHILDHOOD.*Frederick Langmead, M.D., F.R.C.P.*

W. Morgan Hartshorn¹ discusses the varieties of infection by this organism in infancy and early life. *Meningitis* receives first consideration. Although the *Bacillus coli* is mentioned as a possible cause of meningitis in many text-books, only a few authentic cases are on record. Smith collected 32 cases, in only 9 of which was the organism obtained in pure culture. To these Hartshorn adds two more. Most of the patients were young babies, and the condition was secondary to inflammation of the intestinal tract, navel, bladder, or middle ear, or to spina bifida. The symptoms resemble those of other forms of meningitis, and the prognosis is not invariably fatal.

Inflammatory conditions of the respiratory tract are seldom due to the *B. coli*. It has been obtained, however, in pure culture in the sputum of patients suffering from pneumonia. Pearson reported a case of empyema following pleurisy and bronchiectasis, in which the

organism was found in the discharge, and Schroter and Weinberger report several cases of bronchopneumonia caused by it. In *Winckel's disease* (*epidemic hæmoglobinuria*), regarded by many as a hæmorrhagic septicæmia, blood-infection by the *B. coli* has been found. In six cases reported by Wolczynski, the infection was supposed to have been conveyed by infected spring-water used for cleansing the mouth. *Acute catarrhal conjunctivitis* is another disease which sometimes owes its origin to the bacillus. Anna Williams has reported several cases in which it was obtained in almost pure culture.

The influence of the *B. coli* and organisms closely allied to it in *intestinal diseases* is too involved and uncertain to estimate with precision. By some they are regarded as beneficent, by others as capable of producing a medley of diseases, ranging from the acute dysenteric disorders of infants to suicidal states and premature old age. The scientific basis on which such conjectures rest is of the frailest.

Infections of the urinary tract complete the list of the infections by the bacillus dealt with by Hartshorn. Although they are far from rare, there are few conditions which are more frequently overlooked. Large numbers of *B. coli* may, it is true, be present in the urine, in both children and adults, without causing symptoms. In adults, however, local symptoms usually suggest a urinary disorder when inflammatory changes occur, whilst in the cases of young children these are often lacking, and the urinary tract remains unsuspect. Moreover, routine examination of the urine of sick infants is often neglected, owing partly to the difficulty in obtaining a specimen. The constitutional symptoms of the disorder vary greatly, and, unless the urine be examined, erroneous diagnoses are easily made. In children, *B. coli* infection of the urinary tract is most common during the first two years of life, and the majority of the patients are girls. Thus, John Thomson reported that girls were affected in 79 per cent, Goffert in 90 per cent, Morse in 60 per cent, and Athole Ross in 83·7 per cent. Three modes of infection are generally conceded as possible: by the urethra, by the blood, and by contiguity through some lesion of the intestinal mucous membrane. The far greater prevalence in girls indicates the first as the most usual path. Athole Ross² favours this view, and thinks that infection of the urethra is due to a direct passage of the organisms from the anal orifice to the urethra. At the same time he considers that this hypothesis, while explaining the majority of cases, will not cover them all, and that the other routes cannot be disregarded entirely. Impairment of the resistance of the patient, in his view, is an important factor, and would help to explain the occurrence of colon bacilluria in such cases as diphtheria, pneumonia, migraine, tuberculous peritonitis, and miliary tuberculosis, in which he had found it.

As Hartshorn points out, three varieties or stages in the disease are recognized: (1) *Simple bacilluria*, a condition in which the urine is highly acid and contains the organism, but there is an absence of

marked constitutional symptoms. Enuresis and anæmia may, however, be present. (2) *Pyelitis*, evidenced by definite constitutional symptoms, large or small amounts of pus in an acid urine, fever, and a protracted course, and afterwards with gastro-intestinal disorders. (Hartshorn does not mention cystitis, which usually, though not invariably, precedes the pyelitis). (3) *Suppurative pyelonephritis*, in which multiple abscesses form in the kidney, and in which the symptoms are more severe and recovery is rare.

R. E. Gordon,³ from observation of a series of cases in a children's hospital, recognizes five groups of acute cases: (1) *Those presenting general symptoms without reference to any special system*. Such cases are marked by a sudden onset of high fever, often accompanied by rigors, by convulsions, or by severe collapse. The temperature may remit or intermit for several weeks, the charts simulating those of malaria or typhoid fever. There are often marked restlessness and irritability, and sometimes pronounced muscular tenderness, but no symptom pointing to affection of any special system. Rigors in infants, as John Thomson has shown, should always suggest this affection. (2) *Those with nervous symptoms predominating*. The symptoms of the patients included in this group simulate those of meningitis. The children may be delirious, convulsed, or drowsy, or even comatose. The similarity may be increased by the presence of rigidity of the neck, strabismus, Kernig's sign, extreme irritability, and frequent screaming fits. There are no urinary symptoms, but the urine is found to contain pus and the bacilli. (3) *Those with pulmonary symptoms predominating*. In these, tachypnœa or dyspnoea, together with high temperature and malaise, suggest the onset of pneumonia or acute bronchitis. A few râles may be heard at the pulmonary base, but the signs fail to develop though the symptoms persist, and not until the urine has been examined is the true cause discovered. (4) *Those with gastro-intestinal symptoms predominating*. The onset is attended by severe colicky pains in the abdomen, vomiting, obstinate constipation, or in some cases diarrhœa. The appetite is lost, and occasionally jaundice appears. Again, no symptom suggests a urinary disorder, but examination of the urine is the key to the diagnosis. (5) *Those with urinary symptoms predominating*. These form the largest individual group of cases, but do not comprise more than 50 per cent of the total number. They present symptoms of cystitis—frequency of micturition, and screaming during it. Such symptoms may be intermittent, but continue unless treatment is adopted. A palpable, tender kidney, varying in size, may be felt in a few instances.

A case which has started acutely may become chronic if untreated, and although it may apparently recover spontaneously, relapses occur from time to time, perhaps for years. In older children the condition may resemble the disease as it occurs in adults, and, beginning gradually, may become associated with anæmia, emaciation, and often extreme debility. Such patients may suffer from periodical

attacks of nausea and vomiting, with slight pyrexia, and may have enlargement of the liver and spleen. There are usually some urinary symptoms, and the urine is diagnostic.

PROGNOSIS.—Gordon regards the prognosis in acute cases as eminently good, provided that they are recognized early and treated properly. Relief of symptoms may be expected in the course of a few days, and a cure established within a short time. Like others, he has found that the chronic cases are less favourable, needing protracted treatment, and occasionally ending fatally despite it.

TREATMENT.—According to Gordon, the treatment advocated by John Thomson, which includes the administration of large doses of **Alkali** (potassium citrate and sodium bicarbonate) relieves the symptoms, but by no means always frees the urine from pus and bacilli. It was supposed that the alkalinity of the urine produced by these drugs is inimical to the *B. coli*, but Jordan has shown that the organism can grow as well on an alkaline medium as on an acid one. Thomson Walker has pointed out that coliuria can be cured in acute cases by the administration of **Hexamine** combined with agents which render the urine acid. This treatment fails only if the urine is not sufficiently acid. In such cases, **Acid Sodium Phosphate** is the best agent to increase its acidity, and may be pushed to large doses without producing ill effects. Gordon recommends, therefore, that when severe symptoms are present, the urine should be rendered alkaline until they have subsided, and then that hexamine and acid sodium phosphate should be given until the urine is free from pus and bacilli. The drugs, being incompatible, must be dispensed in separate bottles. Such treatment, although it cures most cases, fails in some chronic ones. For these he considers autogenous **Vaccines** a valuable adjuvant. Although 10 million organisms may constitute the initial dose, to obtain good results 50 million are usually required, and 200 or 400 million are sometimes necessary to effect a cure.

Lactic Acid recommended (*p.* 21).

REFERENCES.—*Med. Rec.* 1914, ii, 298; ²*Lancet*, 1915, ii, 654; ³*Bristol Med.-Chir. Jour.* 1914, 286.

BACKACHE.

J. Ramsay Hunt, M.D.

The etiology and diagnosis of *chronic backaches* are discussed from the standpoint of the orthopædist by Platt,¹ who distinguishes the following groups of cases :—

1. Traumatic lesions—Lumbar spine, sacrum, coccyx—
 - a.* Sprains—spinal ligaments, spinal joints.
 - b.* Fractures.
2. Sacro-iliac joint strains—
Lumbo-sacral joint strains; postural strains.
3. Pelvic visceral disease.
4. Arthritis of lumbar spine—various types.

Rheumatoid arthritis; osteo-arthritis; infective arthritis—gonorrhœal, etc.; spondylitis deformans; typhoid spine.

5. Bone lesions—Lumbar spine, sacrum, coccyx—
Chronic granulomata—tubercle, syphilis.
Neoplasms.
Charcot's disease.
6. Nervous system lesions—Cord, cauda equina, meninges.
Inflammatory; neoplasms.
7. Traumatic neuroses—
Hysteria, neurasthenia, malingering.

Especial attention is given to the traumatic lesions of the spine, and sacro-iliac and lumbosacral joint strains.

The classical acute fracture—dislocation of the spine with injury to the contents of the spinal canal—is the least common form, although the one best known. The wide use of the radiogram has, however, demonstrated the frequency of minor or 'quiet' fractures of some portion of the vertebra, which course under the clinical picture of contusion or sprain. In the interpretation of radiograms, it is important to recall the occasional presence of congenital linear clefts in the transverse processes of the lumbar region, resembling closely a line of fracture. The line of true fracture is more irregular, and callus formations are usually present.

Sacro-iliac joint lesions and strains are characterized by backache, sciatic pain, lameness, disablement, and local tenderness over the posterior aspect of the affected joint. The special signs are spasm of the muscles controlling the lumbar spine, painful limitation of the extremes of hip-joint motions—especially abduction and external rotation—limitation of the degree to which the lower limbs can be flexed at the hip with the knee extended—the so-called 'straight leg-raising test,'—in brief, any movement or manipulation which would tend to produce motion of the innominate bone on the sacrum, is painful and evokes muscle spasm.

The potential instability of the lumbo-sacral articulation, pointed out by Goldthwait, is also considered in this connection, and some of the cases presenting less clearly defined sacro-iliac features are due to strain or actual displacement at the lumbosacral articulation (spondylolisthesis). In conclusion, the author agrees with Lovett's point of view, that many non-traumatic cases described as typical of sacro-iliac lesion are best classed as postural or static strain, the result of a defective balance, with forward displacement of the centre of gravity leading to undue stress on the posterior musculature of the trunk and thighs.

Ogilvy² also discusses briefly the subject of backache from the orthopædic standpoint. Of special interest is the group of cases caused by disturbances of the foot mechanism, and which may or may not be accompanied by painful symptoms in the feet. In such cases the treatment should first be directed to the correction of this defect. His conclusions are as follows: The exact cause of backache should be sought for and definitely determined. This is very often found to be a postural deformity with resulting muscle strain, and

the cause of the postural deformity is very frequently weak feet. A sacro-iliac joint strain, with or without muscle strain, is also responsible for a number of cases. When retrodisplacement of the uterus is suspected, a bimanual examination will immediately settle the diagnosis. The diagnosis of muscular rheumatism should seldom be made, as by so doing we are simply evading the question. When myalgia is present, an infectious origin should always be sought for.

A form of backache, the true nature of which is not generally recognized, is that described by Ramsay Hunt³ as '*ischæmic lumbago*,' or '*intermittent claudication of the lumbar region*.' The recurrence of the symptoms regularly during muscular action, and their prompt cessation during rest, are characteristic of this type of lumbar pain, the blood-supply being sufficient in the passive state, but not equal to the increased demands during activity. It is readily recognized and differentiated from all other affections of the back by the following characteristics: There is a sensation of pain or painful cramp, which may be associated with a feeling of weakness or stiffness, localized in the muscles of the lumbar region. This may be bilateral or strictly unilateral in distribution, and is limited above by the twelfth rib and below by the crest of the ilium. When severe, the pain may radiate as far laterally as the mid-axillary line. The painful area is not tender to pressure, except after prolonged exertion, and then the pain is not of long duration. It is characterized by the intermittent character and absolute dependence on muscular exertion. If there is no effort or strain on the muscles, there is no pain. When the pain is induced, any posture which places the affected muscles at rest promptly produces relief, and the pain ceases. The underlying lesion is supposed to be a vascular one, arteriosclerosis either of the lumbar arteries or of the abdominal aorta, thus interfering with the flow of blood into the lumbar vessels.

For diagnostic purposes, bending movements of the spine may be used to induce the pain and demonstrate its local and intermittent character. The movements of the spine are normal, and in the beginning painless, and this is an important distinguishing feature from lumbago of rheumatic origin.

REFERENCES.—¹*Med. Chron.* 1914, 80; ²*N.Y. Med. Jour.* 1914, ii, 1107; ³*Jour. Amer. Med. Assoc.* 1914, ii, 671.

BALANTIDOSIS.—Cured by **Salvarsan** (p. 28).

BANTI'S DISEASE. (*Vol.* 1915, p. 139.)

BERI-BERI.

Sir Leonard Rogers, M.D., F.R.C.P.

ETIOLOGY AND PREVENTION.—W. P. Chamberlain¹ records the remarkable results in the prevention of beri-beri among the Philippine scouts by modification of diet in accordance with the results of recent research. He was in charge of the beri-beri work among the Filipino (native) troops from 1910 to 1912, when the disease was eradicated, while the lapse of time makes it practically certain that

the abatement of beri-beri was not a temporary remission, but was actually due to the change of dietary. Over 5000 men were located in all parts of the islands, and freely mixed with the surrounding civil population, among whom the disease persists. Up to 1910 beri-beri was the scourge of the force, and in the previous two years the maximum prevalence occurred in spite of six years' strenuous sanitary efforts to reduce it, the total annual admissions having risen to 618, with a considerable death-rate. During 1910 certain dietary changes were made, and the admissions dropped at once to 50. In 1911 there were but three admissions, in 1912 two, in 1913 none, and in 1914 only one up to June 30, the date of the last report. In 1908-09, when beri-beri was at its worst, the diet consisted of 12 oz. fresh beef, 8 oz. flour, 8 oz. Irish potatoes and 20 oz. highly milled or polished rice imported from Siam. The wheat was of the high grade which has been shown to produce polyneuritis in fowls. The amount of meat was only sufficient to delay the onset of polyneuritis. As a result of the work of Braddon, and Fraser and Stanton, it was decided in November, 1909, to reduce the rice from 20 to 16 oz. and to add 1.6 oz. of beans, and later, unpolished rice was given. After some changes, in May, 1911, the following diet was finally adopted: Fresh meat 12 oz., flour 8 oz., unpolished rice (of a high grade with a white pericarp, being both palatable and not unsightly in appearance, and containing 0.4 per cent phosphorus pentoxide) 20 oz., potatoes 8 oz., sugar 2 oz., and suitable condiments. The addition of the beans or mangoes alone stopped the beri-beri; but as it would be difficult to be sure that all the men eat their proper quantity for long periods, it was thought safer to give an unpolished rice. The results of these measures were as follows: Before the diet had come into force or had time to operate, the admissions for beri-beri were 624 in 1908 and 604 in 1909. In 1910 only fifty cases were admitted, although the full effect of the new diet was not obtained by the beginning of the year; in 1911 there were only two admissions, in the following year three, and during the years 1913 and 1914 none and one case respectively. During the same years the disease was very prevalent throughout the islands among the civil population, which is very strong evidence against the disease being infectious, as the scouts mingle freely with them.

The above results furnish most conclusive evidence of the dietetic origin of beri-beri. The following points have received insufficient attention from the opponents of the new theory. Firstly, many articles besides rice are deficient in neuritis-preventing vitamins, including fine wheat flour, wheat bread, macaroni, 'ship biscuit,' sago, etc., and possibly potatoes. Secondly, exposing a food to a temperature above a certain point, such as 120° C. in the case of rice, destroys the vitamins. The sterilizing of foods for preservation in tins may thus deprive meat, beans, and peas of their beri-beri-preventing powers. It should also be remembered that the incubation period of beri-beri in man is much longer than that of polyneuritis in fowls.

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S. T. Darling² has published an interesting study of the pathological affinities of beri-beri and scurvy, after visiting South Africa where cases of the latter disease were examined. In fatal scurvy he found right-sided hypertrophy and dilatation of the heart and degenerative changes in the vagus terminations in the heart, just as are seen in beri-beri. He gives a diagram in which he places the following diseases in the order named, and shows that the symptoms of each overlap those of the next-named disease: Rickets, infantile scurvy, scurvy, ship beri-beri, beri-beri, and polyneuritis of fowls. He found scurvy more severe in tropical negroes than in South African labourers, and noted that their diet was too largely carbohydrate in nature. Cases were more numerous during a drought, when fresh vegetables could not be obtained.

W. M. Strong³ describes beri-beri in Papua. The natives when fed on European diet get beri-beri, but not those living on their own diet. Sore mouth, sometimes going on to noma, occurs, and is readily cured by a simple mouth-wash and fresh vegetable food and lime-juice. Since native foods have been obtained for labourers and prisoners, severe types of beri-beri have become rare.

R. R. Williams and B. C. Crowell⁴ have investigated the theory advanced by Funk of a relationship between atrophy of the thymus gland and beri-beri, and find that it is not supported by facts.

TREATMENT.—R. R. Williams and N. M. Saleeby⁵ record investigations on the treatment of beri-beri. They first gave allantoin, which they found to be present in Funk's vitamins, but it proved to be of very little value. They next tried a **Hydrolysed Extract of Rice Polishing**, extracted with 20 per cent alcohol. After concentrating in vacuo and precipitating with strong alcohol and removal of the alcohol by evaporation, the residue was hydrolysed by heating for five hours on the steam bath with 10 per cent sulphuric acid and removing the acid with calcium carbonate, and the extract made up so that 1 c.c. equalled 10 grams of the original polishings. This hydrolysed extract produced complete cures in acute infantile cases, and gave distinct relief and better results in chronic cases than any other treatment, although too much must not be expected wherever organic nerve lesions have resulted. Unhydrolysed extract was very beneficial in infantile, but not in adult, cases. Vitamine prepared by Funk's method gave very satisfactory results, but is prohibitively expensive for general use among poor people. These results confirm the theory that beri-beri is due to deficiency of vitamins in the diet due to living largely on highly polished rice.

Jose Albert⁶ describes the use of an extract of rice polishings (called tiqui-tiqui in the Philippines) prepared according to the method of Chamberlain and Vedder; 5 c.c. of the extract represent about 82 grams of rice polishings, which are very unpalatable if given without extraction. In children, 20-drop doses were given every two hours when awake up to a total of 5 c.c. a day. He has used this treatment since 1912 with great success, the symptoms largely disap-

pearing within twenty-four hours and nearly vanishing, except for aphonia, after three days. The aphonia usually lasts for seven or eight weeks, and the treatment should be continued until it also disappears, and for not less than three weeks. If improvement is not marked in twenty-four hours the dose should be doubled. Legislation has been passed to make this treatment available free of charge to the poor in the Philippines.

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1915, i, 1215; ²*Ibid.* 1914, ii, 1290; ³*Jour. Trop. Med.* 1914, 310; ⁴*Philadel. Jour. Sci. Sect. B.* 1915, Mar. 121; ⁵*Ibid.* 99; ⁶*Ibid.* 1915, Jan. 81.

BILIARY TRACT, SURGERY OF. (See GALL-BLADDER.)

BLADDER, SURGERY OF. (See also pp. 64, 66.)

J. W. Thomson Walker, M.B., F.R.C.S.

A number of articles on the indications for surgical intervention in obstruction at the neck of the bladder were presented at the annual meeting of the American Urological Association (1915). Cunningham¹ referred to a small group of cases where the symptoms were those of enlarged prostate, but no enlargement of the prostate was present. All the patients he had seen were over fifty years of age, and an erroneous diagnosis of prostatic obstruction was based on the discovery of enlargement of the prostate by rectal examination, and the demonstration of residual urine by the catheter, or on percussion. In each case a median perineal operation was performed, and a stricture in the deep urethra encountered and divided; the urethra beyond the stricture was found to be dilated, so as to admit the thumb. The dilatation of the prostatic urethra was the cause of the apparent enlargement of the prostate, for examination of the prostate per rectum, subsequent to operation, showed the gland considerably diminished in size. The author surmises that, had these patients been operated upon for prostatic obstruction by the suprapubic route, the stricture might have escaped detection.

Chetwood looks upon three conditions as being closely allied, namely, the small hard prostate (fibrous prostate), the prostatic type of contracture, and the prostatic variety of stricture. These, he says, are different degrees or variations of a similar pathological process. When the obstruction consists of a distinct bar or bridge formation, the author recommends galvano-cautery incision through a perineal opening. Some types of small fibrous prostate that are anterior to the urethral orifice are best treated by careful dissection through a perineal incision, and this should be done, "if possible, by submucous excision." The external sphincter should be carefully preserved. Other forms of fibrous prostate which lie behind the urethral orifice may be reached by suprapubic section, the internal urethral orifice being treated by forced divulsion to the extent of splitting the sphincteric ring, or an incision may be made with the galvano-cautery.

Turney states that prostatic obstruction, without enlargement, may

be due to : (1) Formation of fibrous tissue beneath the mucous membrane, and infiltrating the internal sphincter—the fibrous ring ; (2) The same process with chronic inflammation of the submucous gland tissue—the bar ; (3) Hypertrophy of submucous gland tissue involving the suburethral or subtrigonal groups, or both ; (4) Connective tissue replacing the glandular tissue below the internal sphincter muscle—the fibrous prostate ; (5) Congenital malformation.

A punch, as suggested by Young, or cautery, as used by Chetwood, will destroy obstructions close to the internal sphincter, and give entire relief. The author has used an electro-cautery through an open tube, introduced through a suprapubic incision, for these cases, and also when the obstruction extends down into the urethra.

The suprapubic approach, Turney holds, is preferable to the perineal. Cases with small obstructing nodules give the most satisfactory results of treatment. Cases with extensive fibrous changes in the gland are benefited by operation, but require careful and prolonged after-treatment.

In regard to the group of cases of retention of urine without apparent mechanical obstruction or demonstrable lesion, Fowler says there is an increasing tendency to regard the retention as due to either unrecognized mechanical obstruction, or to a nerve lesion invading the centre controlling the bladder, or interfering with its innervation. The mechanical obstruction may be so slight as to be easily overlooked by the usual methods of examination. The three forms of obstruction met with are, contraction of the vesical outlet, median bar, and minute peri-urethral adenomata. To these Fowler adds, "small intra-urethral projecting prostatic lobes." These may be discerned by means of the cystoscope, examining the prostatic urethra during removal of the instrument.

Belfield points out that the seminal vesicles lying at the bladder base may, when infected, cause lesions of the bladder neck which result in partial or complete retention of urine. These lesions are : (1) Acute infections of the vesicles, causing inflammatory swelling of the bladder neck ; (2) Chronic infections of the vesicles, with chronic partial retention of urine ; (3) Fibroid induration of the bladder base and neck, resulting from perivesicular infections ; (4) Primary carcinoma of the seminal vesicles.

In an article on the treatment of *cystitis* by intravesical injections of **Lactic Bacillus cultures**, Newman² states that he first employed these cultures for the treatment of sloughing wounds. A suppurating sac, or a putrid granulating surface, was found to clean up rapidly. It was found to act more satisfactorily than chemical antiseptics, and the lactic bacillus, not being a pathogenic organism, produces no toxic effects or local irritation. A pure culture of Bulgarian bacilli in a solution of sugar of milk is the preparation used. It is prepared as follows : Dissolve one part of sugar of milk in 40 parts of sterile water, boil for ten minutes, and allow to cool. Add one tube of Oppenheim's 'lactogen' to 20 oz. of the solution, and keep it,

with precautions against contamination, at a temperature of 70° for ninety-six hours, shaking the flask occasionally. When cystitis is due to organisms which decompose urea, the carbonate of ammonia formed renders the urine very irritating and offensive, and the bladder and urethra are unable to tolerate local treatment. The best fluid for irrigation here is **Potassium Permanganate of Potash** 0.025 per cent, gradually increasing to 0.1 per cent solution. Continuous irrigation with a double catheter may be useful. Where the bladder capacity is considerable, but the urine is offensive and viscid, a preliminary irrigation with potassium hydrate solution (1 dr. to the pint) is made to dissolve the viscid mucus. Then the bladder is washed with sterile water and is filled with lactic bacillus culture fluid. This is drained off, and then 2 oz. are injected into the bladder and allowed to remain as long as the patient can retain it.

Cabot³ holds that the term '*diverticulum of the bladder*' should be confined to "cases of pouches, always of congenital origin, occurring most frequently in certain positions, but occasionally seen in almost any portion of the bladder, and not due to defective development, or lack of closure of any recognized structure." These pouches, he states, are found frequently in individuals in whom obstruction is totally absent. The diverticula are covered by the normal coats of the bladder, though the contractility of their muscular fibres is defective. The position of election is in the neighbourhood of the ureteral openings. Occurring elsewhere in the bladder, they cause less damage and are less important. The effects on the urinary organs result from pressure upon the ureter, and from inability of the diverticulum to empty itself completely, with consequent liability to infection. The diagnosis is made by means of the cystoscope.

Lower⁴ believes that diverticula of the bladder are all acquired. They are usually found in patients past middle life, when obstruction to the outlet of the bladder most frequently occurs. Necropsies on children do not show this condition. They very seldom occur in women. The bladder wall is usually thickened, pointing to obstruction. **Excision of the Sac** is the only effective treatment, and it is facilitated by packing the cavity with gauze.

Operations on tumours of the bladder formed a subject of discussion at the American Urological Association in April, 1915. In 22 consecutive cases of bladder growth, Thomas⁵ found 45.4 per cent were inoperable from the standpoint of cure, when first seen. In 22.7 per cent the character of the growth was indeterminable at the time of the first cystoscopy, but in only 9 per cent was such the case after two or three probationary high-frequency endovesical applications. When the pedicle is infiltrated or the growth sessile, resection of the bladder is the only form of treatment if the growth is still operable. In doubtful cases, if no beneficent effect follows a few high-frequency applications, a radical operation should be decided on at once. Thomas protests against the removal through the urethra of portions of tumours for microscopical examination, as this tends to implant

cells and produce recurrence, and thus far outweighs any advantage from the diagnostic standpoint. He has never seen a case of true papilloma that was not destroyed effectively by high-frequency coagulation, nor has he observed a case of carcinoma invading the pedicle or bladder wall that was cured by the electric spark.

For **High-frequency Electro-coagulation**, Thomas uses a double catheterizing cystoscope and two electrodes, the one to replace the other when the tissue of the tumour becomes welded on the tip of the electrode. He uses the Oudin or unipolar current as originally suggested by Beer. The application should not be painful, and no spark should be visible. Small bubbles of hydrogen gas rise through the fluid in the bladder. This is followed by blanching of the tissue, due to dehydration or coagulation. The dead tissue sloughs away in a few days. Treatments should not be given oftener than twice a week, usually only once a week, and frequently at intervals of two or three weeks. The author does not favour the treatment by radium, or intravesical operation carried out by way of the urethra, and irrigation with coagulable solution he regards as useless. He is strongly in favour of the transperitoneal route for resection of the bladder wall. Unless the bladder is infected, or the ureter has been transplanted, it is unnecessary, Thomas holds, to drain either the peritoneal cavity or the bladder.

Geraghty states that in 68 cases of bladder tumour seen in the past four years at the Johns Hopkins Hospital, fulguration has been employed in 47, and in 36 of these the tumours were papillomata. In 10 cases the tumours were either hard, lobular, infiltrating carcinomata, or diffuse papillary carcinomata, with infiltration of the bladder wall. Of the 36 papillomata, a histological study was made in 25 cases. Of these, 8 were typical benign papillomata, and 17 malignant papillomata of varying degrees of malignancy histologically. The Oudin or unipolar current was employed in practically all the cases. Fulguration succeeded in destroying only the papillomata, and both the benign and malignant histological varieties were destroyed. The response to treatment varied, however, according to whether the papillomata were benign or malignant. The histologically benign papilloma disappeared rapidly under treatment. The histologically malignant papilloma responded very slowly, and required many more applications. In papillary carcinoma, or sessile tumours, where infiltration of the base was present, "the chances of eradication of the tumour by this method of treatment are practically nil."

Fulguration, according to Geraghty, should be the treatment selected for all papillomata, benign or malignant, in which infiltration of the bladder wall has not occurred, and it yields results that are superior to operative treatment.

Schmidt discusses very fully the methods of treatment of bladder growths. Referring to transperitoneal operations, he says, "I have seen in my own, as well as in the work of others, cases of peritonitis and death following the deliberate as well as the accidental entrance

of urine into the peritoneal cavity, during operation on an infected bladder. For this reason I cannot permit to go unchallenged the statement that no harm results from the transperitoneal operation, and hence this operation should be advised as the one of choice simply because it makes the tumour more accessible." Schmidt favours the vertical median abdominal incision of appropriate size. He sees no advantage in a transverse incision.

Keyes uses the monopolar or Oudin, in preference to the bipolar or d'Arsonval, current. The effect of the monopolar current is a relatively superficial desiccation or electro-coagulation, while that of the bipolar current is "a deep baking or thermo-penetration." At most, the monopolar current can cause nothing more than a radically localized burn, while the bipolar current, if used in sufficient strength, can destroy the vitality of almost any extent of tissue. Many operators hope by this means to destroy even the carcinomatous base of a papillary bladder tumour. "A vicious malignant bladder tumour, however small it may be, cannot be controlled by electricity in any form." Only tumours of relatively slight malignancy can be successfully treated by electro-cauterization, and for these the monopolar current is sufficient, and is safe. In selecting cases for treatment by electric desiccation, Keyes relies upon the following characteristics which indicate malignancy, and therefore contra-indicate treatment by this method: (1) Hardness of the tumour; (2) Intractable cystitis; (3) Sloughing or ulceration of the tumour; (4) Multiplicity and size of tumours. The chief complications following the desiccation treatment of bladder tumours are: (1) Electric shock; (2) Loss of time; (3) Neglect to continue treatment; (4) Hæmorrhage.

Among Beer's collected cases, ten recurrences are noted. In some of these cases multiple tumours were present at the initial examination, and recurrences were found in various parts of the bladder. These recurrences cannot be guarded against, but they are easily treated by this method. In other cases relapse takes place at the point where a tumour has been burned away. Such relapses are not infrequent during the first three months after the apparent destruction of the tumour, and an examination must therefore be made after this period. The tendency to relapse is probably slight after the first year.

Squier contrasts **Radium** and **Surgery** in the treatment of vesical neoplasms. It is not at present known what quantity of radium must be applied to kill a cell of a cancer at a given distance. It is certain that in the benign epitheliomata of the face, including many types of basal-cell epithelioma, radium is capable of inducing a cure. Radium will not cure a carcinoma or sarcoma at a distance of three or four inches from the tube. It is useless to expect any effect from the quantities of radium now available, at a greater depth than about two inches from the tube. Within this distance it is often possible to influence tumour growth, but the quantity of radium required is so large that but few have the necessary amount. By large

quantities is meant 400 or 500 mgrams. The application of these quantities frequently results in serious burns, in spite of screening. Extreme caution is therefore necessary when applying radium to vesical tumours.

In benign or mildly malignant bladder papillomata, radium may be used by the urethra, or through a suprapubic incision, and placed in contact with the base of the growth in quantities of 200 mgrams for twenty-four to forty-eight hours, and "there is no question that a good deal of effect may be secured within a radius of two or three inches from the site of the application." The danger of deep ulceration, with production of retrovesical fistula or fibrosis, must be borne in mind. In malignant tumours of the prostate, the tube should be buried in the body of the tumour, so as to get the full effect of the rays in all directions. The final results of the application of radium to tumours of the bladder or prostate cannot at present be estimated, as the number of cases is too small and the time too short. At least three years' interval should be allowed before claiming a permanent cure. To report a cure at the end of two months is the height of folly. It is wiser not to consider radium as the primary therapeutic choice in the treatment of vesical tumours when operation is possible.

From a study of 113 tumours of the bladder, Buerger concluded that a differential diagnosis between papilloma and carcinoma can be made in almost all instances on a histological basis. Certain morphological criteria were accepted as indicating the existence or the acquisition of malignant traits in any given tumour. These abnormalities are: cells manifesting irregularities in size and shape; nuclei rich in chromatin, deeply staining, and of bizarre shape; cells with atypical mitosis, giant cells, and multinucleated cells. All these, when occurring in papilloma of the bladder, indicate the presence or beginning of carcinomatous change. The author admits, however, that "certain variations in the type cell belong to the benign growths, and that the proper estimation of such changes depends to a great extent upon personal interpretation."

In the case of other organs, such as the thyroid, liver, etc., atypical cells *per se* cannot be regarded as evidence of malignancy. In the bladder tumour, Buerger holds that, whenever such cells are present, a thorough search will often disclose other distinct evidence of malignancy. Another and most reliable evidence of carcinomatous change will be found in "a disturbed relationship of the cells to each other, in a loss of typical palisade arrangement of the cells, in the presence of long fusiform or compressed types of cells, in the existence of evidence of infiltration of the stroma and penetration of the basal membrane, in the presence of cells in the capillaries, and, finally, in the occurrence of epithelial cells in the submucous or muscular coats of the vesical wall." These criteria were found to be present in parts of the tumour accessible to cystoscopic instruments and removable for histological examination. The changes indicating malignancy

occur, not in the depth, where they may escape observation, but in the epithelium not far from the surface, either with or without areas of infiltration. Only in one tumour was a papilloma found to infiltrate and still retain normal cellular characteristics.

The treatment of tumours of the bladder by the **High-frequency Cautery** is discussed by a number of authors. Kretschmer⁶ holds that success in treatment by this method depends upon the careful selection of cases. It has been suggested that a small piece of the tumour be removed by the operating cystoscope for microscopical examination. This procedure has been condemned by many as being not only unsatisfactory but positively dangerous. Beer suggested that the lack of clinical progress in the treatment would suggest a malignant growth. This does not, however, hold true in every case. The best results have been obtained in primary papilloma, or in papilloma that has been operated on and has recurred. Kretschmer recommends that the application of the cautery should commence at the periphery in small growths, and, if thoroughly carried out, only one or two treatments will be necessary. In very large growths it might be necessary to apply the current directly to the pedicle of the tumour, but this may not be possible. Pain is due to the cystoscopy, and may not be well tolerated by a sensitive, nervous patient. No pain results from the application of the high-frequency current to the periphery of the tumour, but when the electrode touches the pedicle or the bladder mucous membrane, pain is experienced. A treatment of three to five minutes' duration may be used for a large tumour in a tolerant patient. The number of treatments varies according to the duration of each and the size of the growth; three or four is an average number. Kretschmer used the method in 10 cases of papilloma. Of these, "8 are permanently cured"; 1 is still under treatment, and 1 has passed from observation. One papillary carcinoma was free from recurrence, on cystoscopy soon after treatment. Six cases of carcinoma gave unsatisfactory results. One case of 'polyp' was cured by one application.

Uhle⁷ comments on the various terms which are used to describe the treatment by high-frequency currents. The application of an electric current of high tension on living tissue produces various changes, from simple hyperæmia to carbonization; terms such as fulguration, desiccation, high-frequency cauterization, and thermo-coagulation have been applied to these thermic effects. Fulguration is merely the production of hyperæmia in an operation wound, by a bombardment of electric sparks, and is never used for the destruction of tissue. As this term is usually employed it is a misnomer, and 'destructive fulguration' is used by some to differentiate it. Treatment by desiccation can only be produced by a static apparatus. According to William L. Clark, who originated this method, it is the thermic effect on living animal tissue which is within the extremes of hyperæmia and carbonization. The result is a rapid dehydration, rupturing the cell capsule and transforming the tissue

into a dry mass. High-frequency cauterization refers to the destruction of tissue by carbonization, and thermo-coagulation is another term used to express the same process. The high-frequency current, which causes destructive fulguration, high-frequency cauterization, or thermo-coagulation, is generated by a coil apparatus transformed by proper accessories. The monopolar Oudin current is the one preferred by most operators, but the bipolar current may be used. Uhle believes that high-frequency destruction of benign growths of the bladder is a very effective method of treatment, even when the bladder is extensively involved. Recurrences are frequent after any method of treatment; therefore cystoscopic examination at stated intervals should be advised in every case of bladder papilloma. The immediate effects in malignant growths of the bladder are apparently good, as is shown by the diminution in the size of the growth and cessation of hæmorrhage; but a cure should not be expected.

Fullerton⁸ records two cases treated by the high-frequency current. He allowed a fortnight to elapse between each treatment. Three or four séances were necessary. Free hæmorrhage was observed in the intervals. McConnell,⁹ who has treated four cases by this method, regards it as the simplest, safest, and most efficient treatment for tumours that are apparently benign in nature and of small size. It is also a palliative in malignant growths, and, combined with surgical procedures, is a means of preventing recurrence after operation, and of preparing the patient for operation.

Keegan¹⁰ discusses **Litholapaxy** in India, and states that since 1878, when Bigelow introduced his operation, as many as two hundred thousand patients, suffering from vesical calculus, have been treated in India. More than half these patients were boys. The most important factors in causation are diet, geological conditions (including the supply of drinking water), climate, clothing, and perhaps a certain hereditary tendency. The triennial reports of the charitable dispensaries of the Punjab for the years 1911-12-13 show that lithotomy was performed in 206 cases in 1913, with a death-rate of 10.52 per cent; 167 cases in 1912, with a death-rate of 13.17 per cent; and in 162 cases in 1911, with a death-rate of 11.8 per cent: an average death-rate for three years of 11.8. Litholapaxy was performed in 2044 cases in 1913, with a death-rate of 2.39 per cent; in 2049 cases in 1912, with a death-rate of 2.68 per cent; and in 1841 cases in 1911, with a death-rate of 2.82 per cent: an average death-rate for three years of 2.63 per cent. The writer quotes a number of other statistics, and comes to the conclusion that "litholapaxy is a far more successful surgical procedure in dealing with stone in the bladder than any form of cutting operation, be it superficial or perineal." [He admits that litholapaxy is not possible in all cases, but omits to mention the important fallacy in comparing the statistics of cutting and crushing operations in a district in which litholapaxy is the operation of choice. The fallacy consists in the fact that in such a district, cutting operations are performed only on cases which are

unsuitable for litholapaxy, namely, the most advanced cases and those that are most dangerously ill.—J. W. T. W.]

According to Bentley Squier,¹¹ until comparatively recently there has been no adequate surgical technique for the removal of growths of the bladder, and this is due to (1) the difficulty of preserving the ureters, (2) the lack of a definite surgical anatomy, (3) the questionable reparative power of the bladder, and (4) the hesitancy to attack the problem along definite surgical lines. "An ideal extirpative operation for vesical neoplasm will be a technique which conserves or reconstructs the three natural orifices of the bladder, and one that removes the tumour *en masse*, with iliac adenectomy where the glands are involved." He suggests the following steps: (1) The incision extends from one inch above the umbilicus to the symphysis. The peritoneum is exposed and the urachus identified. (2) The peritoneum is incised from the umbilicus to the level of the fold of Douglas, the patient placed in the extreme Trendelenburg position, and the intestines are packed off. (3) The urachus is grasped and pulled up with forceps, and the obliterated hypogastric arteries are identified. The left hypogastric is pulled up to the right, and the vas deferens is exposed. (4) The vas deferens is followed back until the ureter is reached. A similar exposure is made on the right side. The author considers the exposure of both ureters the essential point in any radical technique. (5) The urachus is divided at the apex of the bladder, the latter is pulled forward, and the peritoneum is stripped from it as far as the rectovesical pouch. (6) The stripped peritoneum is attached to the upper angle of the wound. (7) The bladder is opened by a median vertical incision. (8) The neoplasm is excised *en masse*, if necessary resecting the lower end of the ureter with it. (9) The wound in the bladder wall is repaired. (10) The ureter is implanted in the bladder wall, and the remaining part of the bladder wound is closed. Drainage is obtained by a 26 F. soft rubber catheter drawn through a stab wound in the bladder wall anterior to the line of incision. (11) The peritoneum is explored, the abdominal wound repaired, a cigarette drain inserted into each lateral space, and a self-retaining catheter placed in the urethra.

Chute¹² gives his opinion that in spite of the greater extent of the operation performed for malignant disease of the bladder, it is doubtful whether the end results are any better. His personal results have not improved, and he doubts whether the number of permanent cures is proportionate to the increased immediate mortality of the more extensive operation. He had operated on eighteen patients, and there was only one without recurrence at the end of three years after operation. So long as the growth is confined to the mucous membrane, it may be excised with a reasonable hope that recurrence will not take place. He considers dealing with the lymphatics of the bladder important in operative treatment, and their removal might give an improvement in the late results.

Hunner¹³ describes a group of eight cases of *ulcer of the bladder*

observed in women. The average age of the patients was 37 years, and the average duration of bladder symptoms was 17 years. He was unable to determine the cause of the bladder lesion in any of the cases. No operation or catheterization had been done on any of the patients. The ulcers were all situated at the vertex of the bladder. There might be scarring of the mucous membrane in the neighbourhood. Two or three ulcers might be grouped in an area of inflammation. Œdema of the surrounding area was found in some cases on operation. The urine was normal in appearance, and contained a few leucocytes and red blood-corpuscles. No account of the bacteriological examination of the urine is given. In five cases the ulcerated area was incised by suprapubic operation.

According to Fuller,¹⁴ *extraperitoneal rupture of the bladder* has received less than its due share of attention, and the results of operative treatment have been unsatisfactory. Although a large percentage of patients leave the hospital alive, Fuller holds "that most of them have been left invalided: the majority severely so." Extraperitoneal rupture generally occurs in the region of the trigonum, less frequently into the space of Retzius, and occasionally at the side of the vesical neck. There is generally one tear, less frequently two, and rarely more than two. Multiple ruptures are usually combined with fracture of the pelvis. In a small rupture, the amount of urine extravasated may be small, causing a circumscribed area of extravasation, and followed, if the case be treated without operation, by a small area of pericystic sclerosis. In the great majority of cases, however, non-operative treatment is followed by a fatal termination. Widespread extravasation occurs within the pelvis, extending behind the peritoneum on the posterior or anterior abdominal wall, and tracking into the perineum, scrotum, and thighs.

When the case is seen promptly, the diagnosis between anuria and intraperitoneal and extraperitoneal rupture is important. If the patient can micturate naturally and the urine is free from blood, there is probably no bladder injury, and expectant treatment is justifiable. If he cannot micturate, a sterile catheter is passed. If neither urine nor blood is drawn, there is probably anuria due to shock; but the abdomen should be carefully watched, and if at the end of a brief interval again no urine is obtained, a measured amount of sterile normal saline solution should be injected into the bladder. If the whole of the fluid is returned, the bladder is not ruptured, but if part only is returned, the abdomen should be opened and the intraperitoneal rupture searched for. If none is found, evidence of extraperitoneal rupture should be sought, the bladder being distended with fluid through a catheter. The abdominal wound should then be closed, and the bladder drained superficially. If the bladder contain blood-clot, or if there is retention due to injury to the bladder neck or deep urethra, suprapubic cystotomy should be performed. If an intraperitoneal rupture is found, the peritoneum should be opened. If extraperitoneal rupture is found, and the operation has been per-

formed before extravasation has taken place, suprapubic drainage only is established. In extraperitoneal rupture, when urinary extravasation has already taken place, Fuller undertakes an extensive dissection of the perineum. Two converging incisions are made, extending from the anus forwards, to join a transverse incision across the mid-point of the perineum. The incisions are deepened into the ischio-rectal fossæ, and, with the left forefinger in the rectum as a guide, this viscous is dissected backwards. The prostate, seminal vesicles, and base of the bladder are exposed. The seminal vesicles are laid open in their entire length. Packing is now introduced, and two drainage tubes are inserted between it and the rectal wall.

In an article on the surgical management of *pericystitis*, Fuller¹⁵ advocates the same operation for drainage of the seminal vesicles.

Wheeler¹⁶ records a case of suprapubic fistula of the bladder of

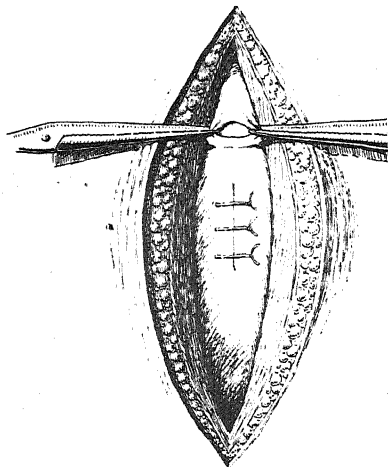


Fig. 9.—Successful operation for suprapubic urinary fistula of twenty-four years' duration. The opening in the bladder has been closed, and the perineum at its reflexion caught in forceps prior to opening.

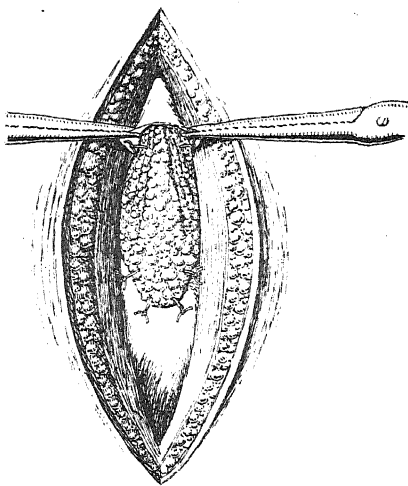


Fig. 10.—An omental flap has been placed over the line of sutures in the bladder prior to closing the superficial wound.

twenty-four years' duration, where a cure was obtained by opening the peritoneum at its reflection from the bladder, and laying a tongue-like flap of omentum between the sutured opening in the bladder wall and the superficial tissues (Figs. 9, 10).

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BLOOD, EXAMINATION OF. (*See also* CARCINOMA, BLOOD-CELLS IN.)*O. C. Gruner, M.D.*

Technique.—Callison¹ recommends the following diluting fluid for the red cell-count :—

R	Löffler's Blue	1 c.c.	Neutral Ammonium	
	Formaldehyde	1 c.c.	Oxalate	1 mgm
	Glycerin	10 c.c.	Sodium Chloride	2.5 mgrams
			Distilled Water	90 mgrams

The mixture is filtered, and is then immediately ready for use.

Cytology.—Santo Pisani² describes a new form-element in the blood, namely, a homogeneous metachromatically staining demilune enclosing a colourless vacuole. He suggests that such bodies are the result of a process of physiological involution of the normal red blood-cell; he considers that they bear a relation to the resistance of the individual towards hæmolytic agents.

Addison's Disease.—An abnormal white-cell picture, according to Engelmann,³ speaks not specially for Addison's disease but for diseases of the glands of internal secretion. The hæmoglobin is relatively high per cell. In three out of five cases the colour index was 1.16, 1.25, 1.26. A characteristic formula in Addison's disease is 40-50 per cent neutrophils, 40-50 per cent lymphocytes, and 5 per cent eosinophile. The Arneth count reads 30-46—20-4—0, when each successive number denotes the percentage of each class of neutrophile (I—V) respectively; that is, there is distinct deviation to the left.

In *Amyloid Disease*, Gullbring⁴ finds a marked increase of the red-cell count.

Bone Metastases.—Roznowski⁵ points out that there may be no change in the blood picture whatever, in spite of widespread dissemination through the bones. Ordinarily myelocytes may be expected, along with a severe secondary anæmia. Normoblasts, and even megaloblasts may be plentiful.

Tuberculosis.—Tonnini⁶ has studied the open and closed forms of surgical tuberculosis from the point of view of the blood-picture. Lymphocytosis is a constant finding in improving cases.

Typhoid Fever, after Vaccination.—Lipp⁷ found that leucocytosis followed the first dose, giving place to leucopenia in three or four days. The count returns to normal after the second dose. The third dose causes no change. Schneider,⁸ on the other hand, found that the leucopenia persists for weeks. Eosinophilia has been noted in some cases, not in others.

Typhus Fever.—Moldovan⁹ finds the leucocytes are increased in this disease after a preliminary fall. The eosinophiles disappear almost entirely. The neutrophils are greatly increased, and show cell-inclusions.

Wounds from Shrapnel.—In Germany there appears to have been some anxiety whether shrapnel wounds can cause lead poisoning. A study of the blood for punctate basophilia has allayed these fears, the red cells having shown no change.^{10, 11}

Surgical Abdominal Conditions.—Levison¹² shows that there is a risk of drawing erroneous conclusions from the blood-count in certain abdominal conditions. A leucocyte count of 15,000 to 30,000 may occur in intra-abdominal hæmorrhage just as easily as in appendicitis and other inflammatory conditions. The clinical features of the case will enable the surgeon to avoid this error. The rise in the count begins within twenty-four hours and lasts until the second day. The differential count reveals no deviation from the normal.

The Normal Differential Count.—This subject is still attracting attention in American literature. There is evidence to show that the normal range varies in different countries and in different races. Two elaborate contributions, one by Miller¹³ and the other by Warfield,¹⁴ may be briefly referred to. The former gives the figures obtained by different observers in the past.

	Neutro- philes	Lympho- cytes	Large mono- nuclears	Transi- tional	Eosino- philes	Mast cells
Pappenheim ..	70-75	20-22	2	6	2-4	0-1
Cabot	60-70	20-40	1	10	5-4	1-5
Bunting	50-60	30-40	6-2	6-8	8-4	4-1.5
Miller	64.288	22.255	8.08	2.81	2.708	0.633
Warfield	50-60	20-30	5-10	5.9	2-8	4-2

Miller's work was done on medical students, 650 determinations having been made on 230 normal individuals. The normal total white-cell count ranges from 4600 to 11,000. One of the conclusions reached is that lymphocytosis is much commoner in normal blood than is ordinarily supposed. Lymphocytes appear to be increased during sleep, and during fat and carbohydrate digestion.

Warfield gives a lengthy discussion as to the best nomenclature for certain cell forms. It is more than likely that a carefully classified differential count is of little real value. As has been shown in previous reviews,¹⁵ it is the detection of certain cell-forms, regardless of their total or percentage number, that is to be the determining factor in diagnosis or prognosis. The blood-cell formula is relatively unstable from hour to hour, and a difference of 5 or 10 per cent in a given type of cell cannot signify to anything like the extent that attaches to the appearance of certain aberrant cell-types in a film. Warfield shows that cells of transitional type are very common in Hodgkin's disease as opposed to typhoid fever. He calls these cells 'endotheliocytes.' They are the largest cells in the blood, amœboid, and possessing bizarre shapes as a result. The large mononuclears are distinguished from them by always having an oval outline, with a much deeper blue nucleus. There is also an enormous increase of platelets in Hodgkin's disease.

Arneth Count.—Knapp¹⁶ finds evidence of a deviation to the right (right shift) in some affections, especially leprosy. In tuberculosis, the shift is more pronounced the more advanced the disease. If

there is no shift at all, the case is neither tubercle nor malaria. Henson¹⁷ is impressed with the relation between the Arneth count and the prognosis of a case. The sum-total of the first two classes (in every 100 cells), over and above 40 may be called an index; and if this be 7.5 in a case of septic infection, the prognosis is grave. If the index be normal, a good recovery may be hoped for. In the case of children, however, the index does not possess such reliable features.

Lymphocytes.—Rodano and Dellaporta¹⁸ have shown that lymphoid cells containing azur bodies are not common in health. They are very notably increased in cases of croupous pneumonia, and apparently this feature can be used for diagnostic purposes.

Cytodiagnosis in Surgery.—The value of blood examinations in deciding for or against a clinical diagnosis is highly assessed by Rey,¹⁹ who presents a series of cases in which surgical interference was successfully employed as a result of the examination of the blood. Obscure abdominal conditions, in which appendicitis is difficult to exclude, may prove to be such as ruptured tubal gestation, gall-stones, perforated gastric ulcer. In hæmorrhage, the red-cell count falls low, whereas it tends to be unaltered in appendicitis. The leucocyte count may be the same in each. Suppurative conditions are usually associated with a high white-cell count and high percentage of neutrophile leucocytes. Gall-stone colic is not likely to be associated with a raised white-cell count at all. Tuberculous glands can be distinguished from Hodgkin's disease with something near certainty by the lymphocytosis of the former and the large monocytosis (large mononuclears) in the second. Perforated gastric ulcer may be mistaken for acute indigestion; a blood-count will effectively decide between the two.

Pneumonia can be effectively distinguished from a simple febricula at the outset. A white-cell count of over 40,000 is strong evidence of pneumonia without any clinical data being utilized whatever. A count of over 30,000 white cells in a case which is certainly appendicitis indicates that there is no likelihood of recovery. The blood-picture in carcinoma, with its tendency to increase of the large mononuclear leucocytes, is regarded as quite characteristic by Rey. (*See also CARCINOMA, BLOOD-CELLS IN.*)

Fragility of Red Cells.—A careful study of this subject is furnished by Bigland.²⁰ The fragility is estimated thus:—A saponin solution of 1-1000 strength is made up with normal saline solution, and kept as stock. 5 c.c. of this solution are diluted with 45 c.c. of saline and placed in a burette. This gives an actual strength of 1-10,000. The blood is collected into a centrifuge tube containing citrated saline solution. After ten minutes in the centrifuge, the supernatant fluid is poured away. A row of tubes are set up on a white porcelain slab, and contain saponin solution varying in amount from 1.4 to 0.4 c.c. A second row of tubes are filled with normal saline from a burette in such quantity that when added to its fellow in row A the total volume will be 3 c.c. A portion of red-cell suspension equi-

valent to three divisions of a leucocytometer is added to each tube in row *B*. The dilution is now run into the corresponding tube of row *A*, beginning from left to right, and reading from right to left in order to ascertain in which tube laking takes place.

A standard is arbitrarily chosen, namely 1.2 c.c. of saponin solution. The tube containing this is marked 100. A blood laking at the same rate as this standard is also 100, and therefore normal. If x be the strength of saponin in the tube whose hæmolyzing rate corresponds to the one under consideration, then fragility = $\frac{x \times 1000}{12}$

Results above 100 may be described as increased fragility or as diminished resistance; results below 100 are described as diminished fragility or diminished resistance.

It is found that the admixture of serum with the corpuscles hinders laking considerably.

The following table indicates some of the results obtained :—

	RESISTANCE	SERUM
GROUP I.		
Chlorosis	Increased	—
Pernicious anæmia	Normal or slightly increased	—
Secondary anæmia	About normal	—
Splenic anæmia ..	Diminished	Not protective
Banti's disease ..	Increased	—
GROUP II.		
Goitre	Diminished	—
Jaundice	Much diminished	Protective
Diabetes	Normal	Abnormally protective
High pyrexia ..	Increased	—

Reaction of the Blood.—Levy, Rowntree, and Marriott²¹ describe a rapid method of determining the hydrogen-ion concentration in the blood. The serum is dialysed, and then examined by means of an appropriate indicator (phenolsulphophthalein). Three c.c. of blood are dialysed against 3 c.c. of 0.8 per cent salt solution for five minutes. The indicator is added, and compared with a coloured standard phosphate mixture of known concentration. The normal value is 7.6 to 7.8. In acidosis it is 7.55 to 7.2.

Tubercle Bacilli in the Blood.—Rumpf and Zeissler²² show that all acid-fast rods in the centrifugate of blood are not necessarily tubercle bacilli, nor even living organisms. A certain percentage of tuberculous subjects, increasing in proportion to the care expended on the search, may have virulent tubercle bacilli circulating in the blood.

Estimation of Blood Sugar.—Epstein²³ gives a simple and accurate method of estimating this in small quantities of blood. The procedure is as follows: 0.2 c.c. of blood is withdrawn from a puncture in the ear by means of a graduated pipette resembling a hæmoglobin pipette.

This is discharged into a small test-tube containing two drops of 2 per cent sodium fluoride or potassium oxalate. The pipette is rinsed two or three times with distilled water, and then the mixture is diluted up to 1 c.c. The blood is thus laked; 1.5 c.c. saturated picric acid is now added in instalments. The mixture is well shaken. The proteid precipitate is centrifuged off, and the clear fluid evaporated down to a few drops; 0.5 c.c. of 10 per cent sodium carbonate is added, and the mixture again evaporated down to a few drops. A colour-change is now produced in proportion to the amount of sugar present. The fluid is slightly diluted, and compared with one or other of two colour standards, until a match is produced, exactly as in the ordinary way of estimating the hæmoglobin. The computation of the amount of sugar is a matter of arithmetic.

Wassermann Test.—Heath²⁴ gives a method of performing this test without the use of the guinea-pig complement. Normal human blood is used instead. The amboceptor consists of sheep-immune rabbit serum. The antigen is extract of sheep's heart (absolute alcohol). Sheep corpuscles are used. Full details are given in the communication, which may be studied by those to whom such a method will be of value.

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1915, i, 1086; ²*Fol. Hematol.* 1915, xix, 2, 119; ³*Ibid.* 335; ⁴*Zeits. f. Tuberk.* 1914, May; ⁵*Zeits. f. klin. Med.* 1915, 377; ⁶*Clinica Chir.* 1914, 6; ⁷*Münch. med. Woch.* 1915, 16; ⁸*Deut. med. Woch.* 1915, No. 14; ⁹Moldovan, Wurzburg, Curt Kabitsch. 1915, 28; ¹⁰*Deut. Arch. f. klin. Med.* cxvii, 2, and *Münch. med. Woch.* 1915, 232; ¹¹*Münch. med. Woch.* 1915, 97; ¹²*Jour. Amer. Med. Assoc.* 1915, i, 1294; ¹³*Johns Hop. Hosp. Bull.* 1914, 317; ¹⁴*Jour. Amer. Med. Assoc.* 1915, i, 1296; ¹⁵*Med. Ann.* 1914, 1915; ¹⁶*Ind. Med. Gaz.* 1915, 95; ¹⁷*Jour. Amer. Med. Assoc.* 1914, ii, 922; ¹⁸*Riforma Med.* 1914, 658; ¹⁹*Pract.* 1915, ii, 676; ²⁰*Quart. Jour. Med.* 1914, 1369; ²¹*Arch. Int. Med.* 1915, 389; ²²*Deut. med. Woch.* 1915, 185; ²³*Jour. Amer. Med. Assoc.* 1914, ii, 1667; ²⁴*Brit. Med. Jour.* 1915, i, 1041.

BLOOD-PRESSURE. (See also PREGNANCY.)

Carey Coombs, M.D., M.R.C.P.

Methods of Measurement.—Prominent among the advocates of the auditory method of sphygmomanometry are the writers of the Aberdeen school. Melvin and Murray^{1, 2, 3} describe their investigations in a series of papers. By the 'auditory' method is understood a compression of the arm similar to that used in the ordinary tactile method, the difference being that the pulse cessation (or rather, restoration after cessation) is listened for instead of being felt. The method in detail is as follows: An ordinary Riva-Rocci type of sphygmomanometer is used, the armlet being 12 cm. broad. This is applied as usual to the upper arm at the heart level, and tightened by inflation in the ordinary way, until the radial pulse is quite obliterated. The armlet bag is then slowly deflated, and the brachial artery auscultated at the bend of the elbow. Melvin and Murray use an Oliver phonendoscope for this purpose, but the ordinary binaural stethoscope is more generally employed.

Five phases of sound are normally audible: (1) Sharp, clear sound,

(2) muffled or murmuring, (3) loud and clear, (4) dull, (5) abolition of sound. The first appearance of the first phase is the index of systolic pressure, according to general agreement. There is less concord as to the index of diastolic pressure, but Melvin and Murray give good reason for their belief that the transition from (3) to (4), i.e., the point at which the sound becomes dull, instead of being loud and clear, is the point at which the pressure should be read as the diastolic pressure.

They have tested theirs against the other principal methods. The tactile method, which relies upon the sense of touch detecting the disappearance of the radial pulse under compression of the brachial artery, gives too low a systolic reading, and is unsuitable—with the usual type of manometer—for the reading of diastolic pressure. The oscillatory method (*see* MEDICAL ANNUAL, 1912, p. 173) gave less constant and reliable results in their hands. According to their readings by the auditory method, the average figures from a series of healthy young adults were: Systolic pressure 111.8 mm. Hg, diastolic pressure 65.7 mm. Hg, pulse-pressure 46 mm. Applying the same method, with a narrower armlet, to the estimation of blood-pressure in children of an average age of $9\frac{1}{2}$ years, they find the systolic pressure averaging 108.1 mm. Hg, the diastolic pressure 72.4 mm., and the pulse-pressure 35.7 mm. They are very emphatic as to the advantages of the auditory over the tactile method in relation to children.

The special value of this method lies in its accurate estimation of diastolic pressure. McWilliam and Melvin¹ have proved that it is really accurate, by checking it experimentally against measurements of actual pressure with manometers connected with the intra-arterial stream. The diastolic pressure is the minimal pressure. When the artery is distended by the pulse wave it experiences the maximal or systolic pressure. At the bottom of the trough between two pulse waves the artery is still distended, and at this point it is experiencing the minimal or diastolic pressure. During life the artery is never free from this degree of tension. When the pulse waves come and the pressure rises to a maximum, the additional stretch ('pulse-pressure') is but momentary; but the diastolic or minimal pressure is persistent and continuous. According to McWilliam and Melvin, the wall of the artery stands the series of momentary distensions with less detriment to itself than the perpetual stretch of the diastolic pressure. From the point of view of determining the stress to which the artery is exposed and its expectation of life, they argue, therefore, that it is more important to know the diastolic than the systolic pressure.

Ferguson² agrees that the moment of diastolic (minimal) pressure coincides with the point of transition from the third to the fourth phase, i.e., from sharp to dull sounds during relaxation of the armlet by deflation. He finds, however, that this point is more sharply determined by observing the transition from fourth to third phase during re-inflation of the armlet. It is easier to appreciate the passage from dull to sharp sounds than that from sharp to dull sounds.

Faught⁶ also is impressed with the value of the auditory method as a means of determining the diastolic pressure: not for its own sake alone, but also because the estimation of the diastolic pressure enables us to determine the pulse-pressure (i.e., the difference between the systolic and diastolic pressures). He says the ratio between systolic, diastolic, and pulse-pressure should be as 3 : 2 : 1. In arterial hypertension the pulse-pressure becomes disproportionately large, and this, he claims, is a more accurate index of the increased burden laid upon the heart than a mere measurement of the systolic pressure. Conversely, the pulse-pressure is disproportionately low in myocardial failure, and this, again, is the truest blood-pressure index of circulatory enfeeblement in such cases.

Richter⁷ found differences between the systolic pressures taken simultaneously from the two arms of the same patient, and is therefore impressed with the need for taking series of readings always from the same arm.

High Arterial Tension.—ETIOLOGY.—Stoll⁸ thinks *syphilis* is a far more important factor in the production of high tension than it is usually thought to be. He attributes this partly to the effect of the infection on the kidneys, especially in congenital syphilis, and partly to its direct attack on the heart and arteries. In his researches he placed much reliance on the luetin test as an index of syphilis. That his views are extreme may be gauged from two of his conclusions: "That hypertensive disease is one of the most common—possibly the most frequent—of the so-called 'late' manifestations of hereditary syphilis," and that "apoplexy and sudden cardiac death in middle life are almost always due to syphilis."

Stengel⁹ thinks the modern tendency to attribute all hypertension to some renal lesion is an excess. He believes that in some instances arteriolar disease is primary and the renal lesion secondary. He draws attention to certain points of distinction between the two types. The history of the case may help, but usually the origin is obscure. He lays some stress on the tests of renal function, especially the phenolsulphonephthalein test. He claims that the association of high arterial tension with satisfactory renal function as indicated by the tests is indicative of primary arteriolar disease. Such cases occur chiefly in women between forty and fifty, well-nourished and often obese. The end of such is cardiovascular and not uræmic. In the primarily nephritic cases, on the other hand, the renal function is poor, the patient's health is obviously undermined, and the end is uræmia. In these cases retinal changes are of ominous import, but in the others less so.

SYMPTOMS.—De Havilland Hall¹⁰ brings forward a group of cases in which *hæmoptysis* occurred, almost certainly as a result of high arterial tension. Such patients are elderly, or at least middle-aged, and free from physical signs of the more ordinary causes of hæmoptysis.

Wiener and Wolfner¹¹ have observed a characteristic *pupillary*

reaction in association with hypertension and arteriosclerosis. The pupil "is found to be larger than the average normal pupil, with a usual minimum size of 4.5 mm. to 5.0 mm. in width, contracts promptly to light stimulus, but immediately returns to the original size and there remains, without the light stimulus having been changed."

Smith and Kilgore¹² are impressed by the number of persons under fifty who show *dilatation of the aortic arch* with the fluorescent screen, in association with arterial hypertension and in the absence of other possibly causal factors.

PROGNOSIS.—Fisher¹³ brings forward some valuable figures, which should be consulted by all insurance medical referees, to prove the extreme importance of sphygmomanometry as an essential part of the routine insurance examination. By its means attention is called to renal and cardiac lesions which might otherwise escape notice, and companies which follow the rule of rejecting all applicants with abnormally high arterial tension, rid themselves of a number of undesirable risks. In a series of such cases, rejected for high pressure alone, and with an average tension of 159 mm. Hg, the mortality was double what would have been expected had they been accepted without reference to blood pressure.

TREATMENT.—Elliott¹⁴ gives an interesting survey of the treatment of high blood-pressure, based on a study of 130 cases under his own care. The treatment, as he says, must include a diagnosis of the cause and an attempt to remove it. In some cases he has found such lesions as uterine myomata responsible, and their removal has been followed by a fall. Again, states of nervous excitement may cause a rise in tension; if so, these must be corrected. For the rest, he does not agree that high blood-pressure is of necessity a sign of chronic renal disease. There is, he thinks, such a thing as 'essential' hypertension. Whatever the cause, he lays most stress in the reduction of pressure on careful study of the patient's general and dietetic habits. Drugs are of value, but chiefly for meeting hypertensive emergencies—angina, headache, and the like—by inducing that evanescent fall of pressure which is all that they are capable of doing. Of these drugs he favours **Sodium Nitrite** chiefly. He also finds small doses of **Iodides**, continued over some time, of value. An habitual morning purge is useful; as salines may set up colitis, he has of late been using **Liquid Petrolatum**. **Bleeding** may be of use for the relief of emergencies, crises of hypertension, and polycythæmia. Diaphoresis with **Pilocarpine** or **Packs** may be usefully employed. He advises dietetic restrictions only in those cases where the kidney is proved to be at fault, and for this purpose he relies on the phenol-sulphonaphthalein test. Cardiac failure should be met at the very outset by **Digitalis** or **Strophanthin** intravenously injected. High pressure is no contra-indication if cardiac failure be present or threatening.

Low Arterial Tension.—Watson¹⁵ has made a series of careful

observations of the action of certain drugs as elevators of blood-pressure. So far as possible, all the conditions were made constant, so as to afford a true basis for comparison. He found no encouragement to the use, as pressors, of atropine, camphor, cotarnine, digitoxin, ergotoxin, or strychnine, and pituitary extract was disappointing. Adrenalin and eserine proved to be effective elevators of blood-pressure, but their side-effects are so disagreeable or dangerous as to render them useless, or worse, in cases of hypotension. His best results were achieved with **Tyramine**, an organic base derived from tyrosin by ferment action, and present in watery extract of ergot. The dose used was 0.04 to 0.08 gram. The action was immediate and lasted nearly an hour. There were no ill effects. It may be injected hypodermically or intravenously, and should be of service in emergencies characterized by fall in arterial tension.

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BONE, CYSTIC DISEASE OF. (See also METACARPAL BONES.)

W. I. de C. Wheeler, F.R.C.S.I.

Much confusion and uncertainty surround this subject, which has of late received considerable surgical attention in the literature. Landon¹ gives a detailed description of the condition frequently referred to as osteitis fibrosa cystica. He considers that benign bone cysts are much more common than formerly supposed, and that true simple cysts are distinct entities dependent upon a localized osteitis fibrosa. The etiology of these cysts is unknown, but a large percentage of cases are associated with trauma during the susceptible growing period of life. The symptoms are vague until the stage of bone weakening is reached, and then a spontaneous fracture draws attention to the condition. The chief importance of these cysts is the possibility of making the differential diagnosis between them and more serious lesions, mainly sarcoma. The recognition of their possibility, a careful history, local examination, and proper interpretation of the radiogram are of the utmost importance. The healing of fractures at the site of cysts is fortunately good, and may result in the cure of cysts. If the diagnosis be correct, operation is always justified. Resection of the bone involved together with the cyst, with a subsequent autogenous bone-graft, is the treatment employed by Murphy with marked success, but curettement and crushing in of the walls, with primary closure of the wound, are generally sufficient for a cure.

Under the term 'osteitis fibrosa cystica' are included intra-osseous affections which are not neoplastic and not dependent upon infection, but rather upon that peculiar metamorphosis of a part or a whole of a single or many bones of the skeleton into fibrous tissue with

a decided tendency to the formation of cysts. The term 'bone cyst' should include these cases of a cavity in the bone filled with fluid in which no other definite disease can be discovered. It follows, therefore, that cysts resulting from such conditions as the breaking down of neoplastic growths, and cysts forming in callus or from liquefaction of subperiosteal hæmatomata should be excluded. Osteitis fibrosa may have an inflammatory origin, but Landon states that it has none of the ear-marks which we associate with inflammatory changes. Its pathological picture is a strong witness for its metaplastic nature. The metamorphosis of the marrow into masses of fibrous tissue, with subsequent degeneration into serous mucoid or fatty material, corresponds perfectly with the changes in true metaplasia.

REFERENCE.—¹*Ann. Surg.* 1914, ii, 570.

BONE-GRAFTING. (*See also* BONE, SARCOMA OF; OSTEOMYELITIS.)

W. I. de C. Wheeler, F.R.C.S.I.

The work of J. B. Murphy in the treatment of fractures by intramedullary bone-grafts, and the success attending the treatment of Pott's caries by Albee's bone-grafting operation, have stimulated surgeons to go further afield in this branch of operative surgery. Albee¹ describes the use of a bone-graft wedge in the treatment of *habitual dislocation of the patella*. In dislocation of the patella outwards, the external condyle is often found on a horizontal plane much lower than that of the internal condyle. When the leg is extended, the patella takes its normal position, but upon flexion is found to be displaced outwards. After a résumé of the various operative methods, Albee suggests the following (*see Figs. 11-14*):—

"A semilunar skin incision is made to the outer side of the patella sufficiently long to reach

below the tibial tubercle and to above the external condyle. Without unduly disturbing the underlying joint structures, the external condyle is incised with a broad thin osteotome on its external surface, making a bone incision of $1\frac{1}{2}$ to 2 in. in length, and about $\frac{1}{2}$ to $\frac{3}{4}$ in. below its anterior articulating surface, and nearly in line with the long axis of the femur. This bone incision allows the anterior surface of the external condyle to be raised to a plane above the internal condyle, by producing a greenstick fracture near the intercondylar groove, the object being to place a permanent and rigid obstacle in the way of the outward displacement of the patella.

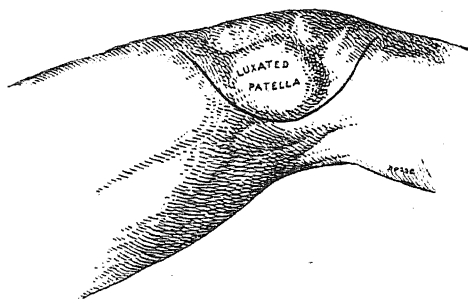


Fig. 11.—Drawing illustrating luxated patella outward, and skin incision.

"When the anterior segment of the external condyle has been prized forward sufficiently to demonstrate its obstructing effect, the width of the bone gap thus formed is measured with calipers and a section of bone sufficiently large to fill this cuneiform gap is removed from the crest of the tibia through the lower portion of the same skin wound extended below the tubercle. This bone-graft wedge can be

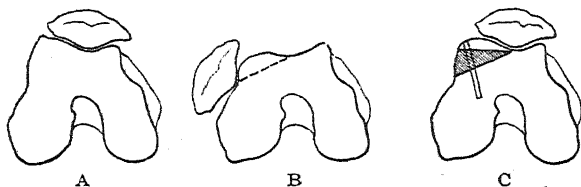


Fig. 12.—A, indicates the normal size and anterior prominence of the external femoral condyle. B, indicates the flattened external condyle with a consequent luxation of the patella outward. C, indicates anterior lifting of the condyle to block the recurrence of the luxation of the patella, with the wedge graft (dark area) in position.

very easily and quickly procured by the use of the motor saw. Before the graft is removed, it is drilled obliquely in one or two places by the motor drill, so that it may be pinned to the under portion of the external condyle when put into its place. Dowel pins, made from an additional portion of the bone removed from the crest of the tibia

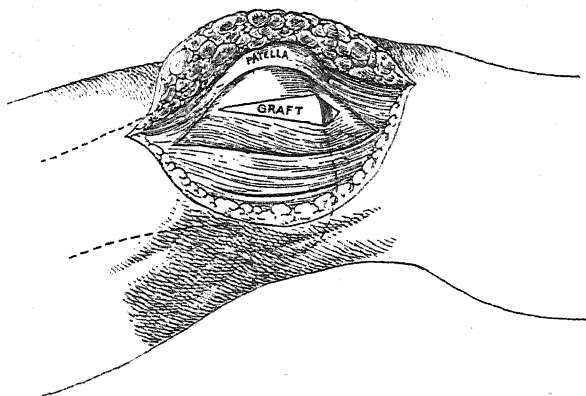


Fig. 13.—Operation for outward dislocation of the patella, showing shape of graft in position, lifting anterior portion of external condyle to block the recurrence of the dislocation.

at the time the graft is obtained, are rounded by the author's motor lathe to fit the drill-holes in the graft.

"The cancellous structure of the condyle receives the pins easily when they are driven into place; or the motor drill can again be inserted into the holes already made in the graft and continue them into the external condyle. The ligaments and tendinous expansions

are now sutured over the graft, thus holding the lifted portion of the condyle securely by kangaroo tendon. The skin wound is closed by a continuous mattress suture of catgut, without drainage, and the leg up to the groin is placed in a plaster of Paris splint for three weeks. Passive motion and massage are begun.

"The advantages of this procedure are that, with no sacrifice of joint cartilage, a minimum of joint injury is produced at the time of operation, thereby greatly lessening the chances of limitation of motion, formation of adhesions or future joint changes (osteo-arthritis, etc.), and that the permanent blocking of any further tendency to displacement of the patella is effected by the actual elevation of the external condyle. The soft parts are not interfered with, and the only further suggestion in the case of extremely lax and stretched internal capsular ligaments is their plication with kangaroo tendon; but usually this is unnecessary, for if the external condyle is propped well forward it in itself fulfils all requirements.

The same author² uses a bone-graft wedge for the treatment of *relapsing acquired and congenital dislocation of the hip*. In many such cases the acetabulum is found to be too shallow, and with the superior rim insufficient to retain the femoral head. The technique of the operation is as follows: All existing contractures having been overcome by force, manipulation or division, and the reduction of the dislocation made easy, an incision is made from the anterior superior spine of the ilium to the great trochanter, curving backwards 1 to 2 in. in the direction of the tuberosity of the ischium. The trochanter with its muscular attachments is sawn off. The amount of deficiency of the acetabular rim can be determined by palpation. The rim is incised in a semicircular line just above the insertion of the capsule. The divided bone segment is prized outward by the osteotome sufficiently to offer an obstruction to displacement of the femoral head. The bone now overhangs and more securely grasps the head of the femur. The relaxation of the capsule brought about by this manoeuvre is corrected by mattress sutures of kangaroo tendon, so that the tightened capsule holds the newly formed acetabular rim in position. A portion of bone is now removed with a triangular cross-section from the crest of the tibia, and is used to fill in the gap or gutter left above the rim of the acetabulum. The wedge-graft, before being completely removed from the tibia, is drilled with holes, which subsequently facilitates its fixation with bone-pegs. It is often advisable to

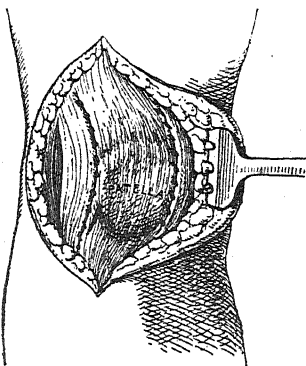


Fig. 14.—Patella fixed in position by wedge graft under external condyle and plicating sutures. (Figs. 11 to 14 re-drawn from the 'Medical Record'.)

divide the graft into several portions, as shown in the accompanying illustrations, *Figs. 15, 16*.

The writer,³ some months before Albee's operation was described, reinforced the upper and posterior rim of the acetabulum by intro-

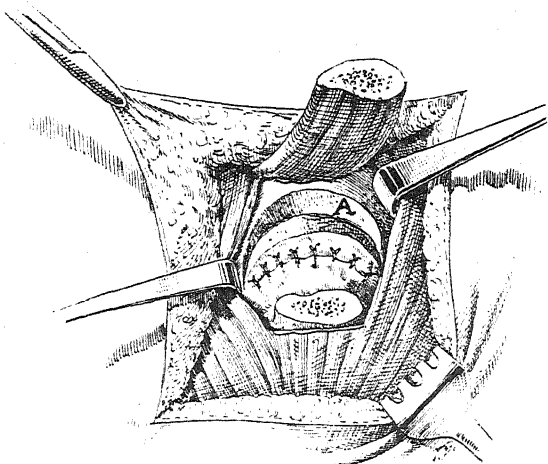


Fig. 15.—Albee's technique of operation for paralytic and congenital dislocation of the hip, illustrating the division of the tip of the great trochanter with its attached muscles, lifted upward to expose the joint capsule. The supra-acetabular curved bone incision and reef sutures in the capsule are shown after depressing the curved bony superior rim of the acetabulum, and *A* indicates the semicircular cavity, with cuneiform cross section, thus formed.

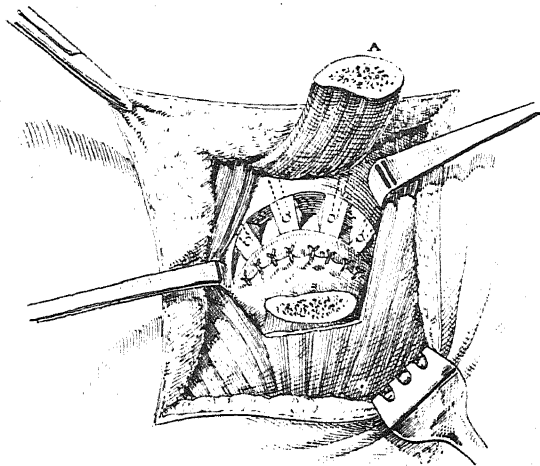


Fig. 16.—Technique of operation for paralytic and congenital dislocation of the hip, illustrating four autogenous bone-graft wedges. These are held in position in the supra-acetabular curved bone gutter by autogenous bone dowel pegs inserted through drill-holes extending through each graft-wedge into the adjacent bony wall of the pelvis. *A* is tip of trochanter turned up with its attached muscles.

Re-drawn from the 'New York Medical Journal.'

ducing a rib-graft in a child, age 4, suffering from congenital dislocation of the hip. Failure attended several attempts to treat the case by Lorenz's method. Through a Kocher's posterior incision, the upper and back portion of the rim of the acetabulum was exposed and freshened with Jones's arthrodesis gouge. Three aluminium-bronze wire sutures were passed through the rim with a strong, fully-curved needle. About a finger's length of one of the upper ribs was removed with intact periosteum and secured to the acetabulum by the wire sutures. The head of the bone was levered into place after the wires were introduced, and the graft secured in the position indicated in *Fig. 17*. Eight months after the operation, as the head of the bone did not appear to be in a satisfactory position, the joint was again exposed, this time through Murphy's 'goblet' incision. The head was found to be in normal relation to the acetabulum when the leg was rotated inwards, and the acetabulum showed an excellent formation of new bone conforming to the size and shape of the graft and deepening the socket considerably. The accompanying illustration shows the plan of the operation. A year after operation the child was walking with a limp and a tendency to displacement of the head in a forward and upward direction, with eversion of the foot.

The same paper records the case of a child, age 5, who had ever-increasing kyphosis of the dorsal region of the spine as the result of a *Pott's caries*. This child had been treated on a Whitman's splint, and subsequently with a spinal jacket, but the progress of the disease was not arrested. Albee's operation was modified in this case by using a rib as the transplant. The curve of the rib fitted that of the spine admirably. The transplant was inserted under the erector spinæ muscle after the method of Robert Jones. The rib was divided with bone forceps just outside the articulation with the vertebræ, and was easily separated under the muscles to the required length.

The laminae and transverse processes were freshened with a bone gouge. The application of the graft alongside of the spinous processes and the procuring of the transplant from the operation area with very little addition to the original vertical incision, made the operation simple and rapid.

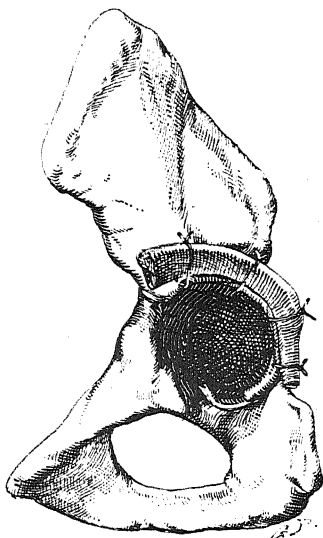


Fig. 17.—Reinforcing and deepening of the acetabulum in a case of congenital dislocation of the hip by means of a rib-graft (*Wheeler*.)

Halstead⁴ describes a new method of treating Pott's disease by means of a bone-transplant. The following are the steps of the operation: (1) A curved incision is made a little to one side of the diseased vertebræ, the ends of the incision lying on the healthy spinous processes above and below. A flap of skin and fascia is reflected. (2) An incision is made along the lateral aspects of the spinous processes extending well above the diseased vertebræ. The soft tissues, including periosteum and muscle, are separated from the surfaces of the spinous processes well down to the vertebral arch. (3) The spines are sawed through at their bases. (4) The divided spinous processes with connecting ligaments are retracted to one side and backwards away from their bases. (5) A transplant is removed from the tibia in the usual way.

The patient is placed in the prone position, and the transplant inserted between the cut surfaces of the divided spinous processes. The transplant is held in place by replacing the retracted detached spinous processes, and secured by chromicized catgut sutures which are passed in order through the periosteum of the detached spinous process, that of the transplant, and that at the base of the spinous process. The spine is immobilized by means of a plaster-of-Paris moulded splint for ten weeks.

Trout⁵ records a case of a child, age 8 months, treated with a tibial transplant for *spina bifida*. A small rectangular piece of bone was removed from the tibia of the father by means of a circular saw, and kept in warm normal saline solution until required. The baby was etherized and the sac readily exposed. The dissection was quickly carried down to the cleft in the spine. An opening was made in the fundus of the tumour, allowing about 300 c.c. of clear serum to escape. The sac was closed up some distance from the ends of the nerve roots with a catgut suture, and the collapsed tumour was then pushed into the cleft. The graft was placed over it and anchored by means of chromic catgut. An x-ray photograph four months after operation showed extensive growth of the bone, and the graft in the patient's back could be felt readily. From the embryological standpoint, *spina bifida* is due to failure of fusion of the neural arches, and it does not seem unreasonable to suppose that a cure can be found by supplying these neural arches with even a homogenous bone-graft.

R. R. Kahle⁶ utilizes a rib-graft in *reconstructive skull surgery*. He reviews a number of cases of tibial grafts applied to close frontal and other defects. The case recorded in this paper had a skull defect 1 by 1½ in., the result of traumatic bone necrosis. A large U-shaped scalp flap was lifted, and the dense fibrous scar filling the defect carefully dissected away. Periosteal flaps were thrown back at both ends of the skull gap. The outer table was chiselled away in a suitable manner to receive the rib. A section of the right sixth rib, with periosteum intact, was removed and modelled to fit the skull. The reflected periosteum was turned over the ends of the rib and the scalp flap sutured into position. Subsequent x-ray photographs showed:

(1) The rib transplanted to the skull acts as a scaffold for the regeneration of new bone; (2) The newly-formed bone patch closely resembled the original skull; (3) A marginal gap of $\frac{1}{8}$ to $\frac{1}{4}$ in. was filled in by the extension of the skull to meet the rib; (4) The inner plate of rib with periosteum intact sharply limited the deposit of new bone; (5) There was total restoration of cranial continuity at the end of six months.

Repair of defects in the skull can, according to other authorities, be accomplished by plates covered with periosteum cut down to the diploe taken from the skull adjacent to the defect. A portion of the scapula has also been used to close defects with the same advantage as with the rib, of having periosteum on both sides, thus lessening the likelihood of proliferative changes leading to an uneven surface on the deep aspect.

Lewis⁷ makes some general observations on the subject of bone transplantation. He does not now think that the graft acts as a scaffolding or, in other words, is simply osteoconductive. He believes that the compact bone of the graft is absorbed, and that it is replaced by bone formed from the periosteum and endosteum of the graft. It is therefore necessary to preserve the periosteum and endosteum as being the most active bone-forming elements. It is preferable to utilize the antero-medial surface of the tibia instead of the crest, for the endosteum as well as the periosteum is preserved, with enough compact bone to maintain the form of the graft and secure some fixation. Some of the cases recorded have developed marked inflammatory symptoms, probably due to the breaking down and decomposition of the marrow.

Some interesting remarks on the effects of infection on bone-transplants are made by Lewis. A severe infection with extensive suppuration usually causes death, with extrusion of the entire transplant, but in many cases of mild infection the periosteum and endosteum survive, and changes occur which resemble osteomyelitis in normal bone. The resulting osteoplastic periostitis produces a layer of new bone resembling an involucrum. The idea that infection of necessity causes death of the transplant has been falsified, more particularly in connection with ploughed fractures which result from bullet and shell wounds. In these cases it is common knowledge that in the presence of sepsis large masses of separated bone will remain viable and become consolidated at the site of fracture during treatment. It would appear that these detached portions of bone are capable of

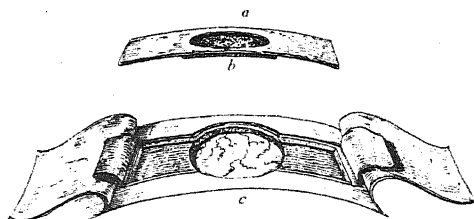


Fig. 18.—Method of using rib-graft in skull surgery: A, opening to provide for immediate nourishment; B, rib section framed to fit opening in skull shown in C; C, skull prepared to fit rib-graft.

forming an involucrum, and that occasionally the thin, dead, cortical bone is the only portion extruded. The immediate insertion of bone-grafts to prevent deformity, even in the presence of infection, is therefore not contra-indicated. They will often remain viable, hasten convalescence, and prevent deformity.

An inlay graft in the treatment of old ununited or recent fractures is more satisfactory than the intramedullary splint, the object being to have endosteum in contact with endosteum, and the periosteum of the graft in continuity with that of the bone surface.

REFERENCES.—¹*Med. Rec.* 1915, ii, 957; ²*N. Y. Med. Jour.* 1915, ii, 433; ³*Brit. Med. Jour.* 1915, i, 288; ⁴*Surg. Gyn. and Obst.* 1915, ii, 12; ⁵*Ibid.* i, 523; ⁶*Jour. Amer. Med. Assoc.* 1915, ii, 222; ⁷*Surg. Gyn. and Obst.* 1915, i, 631.

BONE, SARCOMA OF.

W. I. de C. Wheeler, F.R.C.S.I.

Much interest is attached to the question of *myeloid sarcoma* of bone, owing to the successful treatment adopted by American surgeons by conservative resections followed by bone-grafting. A very exact knowledge of the pathology of myeloid sarcoma and myeloma is essential if the cases suitable for conservative treatment are to be recognized.

Matthew Stewart¹ draws attention to the fact that even after microscopic examination a malignant giant-cell tumour may be mistaken for a myeloid sarcoma. The object of the contribution is to emphasize the importance of distinct true myeloids from other giant-cell sarcomata. Fifty cases are recorded. Stewart points out that giant-cell sarcomata consist of two classes: (1) Myeloid sarcoma (myelomata—some authors); (2) The malignant giant-celled sarcomata. Myelomata, according to Bland-Sutton, do not infect the lymph-glands nor disseminate. These differ histologically, pathologically, and clinically from sarcomata, with which they have hitherto been grouped. Stewart quotes Bloodgood, of Baltimore, as saying that at the present time we are without proof that the pure giant-celled sarcoma ever has metastasis. It is a question, therefore, whether it should be called a sarcoma. Eve, however, thinks that the nearer these growths are to the body (for instance, myelomata of the femur) the more likely they are to be followed by metastasis. It appears that although myeloid sarcoma is only locally malignant, in which respect it is analogous to rodent ulcer, there is no reason to prevent sarcomatous transformation as happens in the case of other benign connective-tissue growths. Of the 50 cases recorded, 35 were in the jaws, 11 in the long bones and 4 in other situations.

TREATMENT.—First, there are those cases in which conservative measures were adopted in the first instance, and second, those in which amputation of the affected limb was carried out as soon as the diagnosis was made. Of 11 cases traced, 9 were alive and well; in 1 the disease had recurred and 1 only had died. The latter was a man, age 40, with myeloid sarcoma of the upper end of the femur, who refused operation and in whose case the diagnosis was

established by exploratory incision and removal of a small portion of the growth. The patient lived for five years. The growth underwent fungation in several places, but there was no evidence of metastasis. Seven cases were treated by local removal of the growth, and 7 by immediate amputation. Of the latter, the 4 cases traced were alive and well. Of the 7 cases treated by local removal of the growth, 3 were cured, 3 recurred, and 1 was not traced. Of the 3 which recurred, 1 was cured by a subsequent local removal and 1 by amputation. The third had recurred at the time of writing. In one case operated upon by Littlewood the tumour involved the upper end of the right femur. A curette was forced through the extended shell of bone, and masses of soft friable growth were thus removed. The growth was scraped away until a hard, smooth wall was obtained. The cavity was packed with gauze, and the wound was quite healed in five weeks. Seven years later the patient was alive and well, and able to perform laborious work. In one of the cases the coccyx was the site of the myeloid sarcoma, a very rare position. The tumour infiltrated the surrounding tissues to a marked extent. The diseased parts were freely excised. Two years later the patient was readmitted with recurrence in situ. Five years later he was in excellent health. In contrast with this series, Stewart draws attention to 6 cases of malignant giant-celled sarcoma. In every instance the disease proved fatal in from six months to two years, and in 4 which attacked the long bones there is a clear history of lung metastasis.

After detailing the histological differences between myeloid sarcoma (myeloma) and malignant-celled sarcoma, the author arrives at the following conclusions. Myeloid sarcoma is locally malignant only, and does not disseminate. It is to be clearly distinguished both clinically and pathologically from malignant giant-celled sarcoma, in which death with visceral dissemination is the rule, even after most radical operations. The histological diagnosis is based upon the morphological characters of the giant cells, and especially as regards their nuclei. In myeloid sarcoma, the latter are numerous, uniform, small, and without mitosis. In malignant giant-celled sarcoma they are few, sometimes single, irregular, and often very large, while mitotic figures are frequent. There is a strong plea in this paper for the conservative treatment of myeloid sarcoma by curettage. As an alternative, however, local resection, with the introduction of a bone-graft when necessary, has given very satisfactory results.

William B. Coley² discusses the early diagnosis and treatment of sarcoma of the long bones. He refers to 25 cases of periosteal sarcoma of the femur from the records of St. Bartholomew's Hospital, not a single one of whom was alive three years after operation; of 28 similar cases from the St. Thomas's Hospital records not a single case passed the three-year limit. Coley attributes the better results in his own practice to the use of his well-known fluid of mixed toxins of erysipelas and *Bacillus prodigiosus* in a certain number of cases before amputation in hope of saving the limb, and in other cases

immediately after amputation in the hope of preventing a recurrence. Coley gives a record of 124 cases, with some remarkable results. In one case—a periosteal spindle-celled sarcoma of the tibia—the tumour entirely disappeared after four months' treatment with mixed toxins. He states that the limb was saved by the preliminary use of these toxins in 11 cases. In another case, a far-advanced periosteal sarcoma of the middle and upper thirds of the femur, the growth was entirely inhibited by four months' treatment with toxins. Subsequently there was a spontaneous fracture, and the leg was amputated at the hip-joint by another surgeon. A year and a half later the patient was well.

In conclusion, Coley considers the chief requirements for the early diagnosis of sarcoma of the long bones may be summarized as follows: (1) A more careful study of all known clinical data; (2) A larger clinical experience in the diagnosis of sarcoma of the long bones; (3) Early and repeated *x*-ray examinations in all suspected swellings, especially in those following trauma; (4) Exploratory operation and microscopic examination of the tissue removed in selected cases, but not as a routine practice. (5) Realization of the importance of not placing implicit reliance upon the negative report of the pathologist when in conflict with clinical and *x*-ray evidence that is strongly positive.

REFERENCES.—¹*Lancet*, 1916, ii, 1236; ²*Ann. Surg.* 1914, ii, 537.

BONE, SURGICAL AFFECTIONS OF. (*Vol.* 1915. *p.* 168.)

BONE, TUBERCULOSIS OF.

W. I. de C. Wheeler, F.R.C.S.I.

Fraser¹ discusses the etiology and pathology of bone and joint tuberculosis. For all practical purposes the type of bacillus is divided into human and bovine, which attacks the human body through the alimentary tract by the ingestion of infected milk. In differentiating it is found that the bovine bacilli grow more luxuriantly and more profusely in certain media than the human form, and glycerin impedes the growth of the bovine, while it stimulates the growth of human, bacillus. If the nature of the bacillus is doubtful, a medium consisting of egg and glycerin is chosen. Most tests, however, are inconclusive. The results of Fraser's investigations showed 62 per cent of osseous tuberculosis cases in Edinburgh to be of bovine origin. This indicated the ingestion of milk infected to a highly dangerous degree. Thirty-eight per cent of the cases were due to human bacillus, and in 71 per cent of these cases there was a history of tuberculosis, usually pulmonary, existing in the family. Fraser thinks that the site of the focus depends on the situation and the reflection of the synovial membrane. If the reflection lies only in relation to the epiphysis, then the latter is attacked, and if in relation to the metaphysis, this is the primary seat of the disease.

Stiles some years ago came to somewhat similar conclusions. He considered the infection in most cases due to contaminated milk, and found that although the epiphysis, if it was not wholly cartilaginous,

might be the site of the primary focus, the metaphysis or juxta-epiphyseal portion of the long bone, was the site of election for the deposit of a tuberculous focus. He showed that a tuberculous embolus was carried into the cancellous tissue, and that a slight injury could break down the walls of a cancellous space and determine the onset of tuberculous metaphysitis.

The first clinical sign of tuberculous metaphysitis is thickening, and some care is necessary to distinguish this from a similar condition due to congenital syphilis.

REFERENCE.—¹*Jour. Amer. Med. Assoc.* 1915, i, 17.

BRAIN, SURGERY OF. (*See also* CEREBELLUM; HEAD INJURIES).

J. Ramsay Hunt, M.D.

Harvey Cushing,¹ in the Weir Mitchell Lecture, delivered before the College of Physicians, reviews his *surgical experiences with pituitary disorders*. In his hands the transphenoidal operation has yielded the best results and is the operation of choice. He is decidedly pessimistic as to the advantages of operation on the hypophysis by either the transfrontal or transtemporal route. In cases of suprasellar lesions where such procedure would be indicated, he advises the more conservative measure of simple subtemporal decompression, as experience has taught him that removal of such growths is impracticable. The tabulation of his operative series is as follows:—

	Cases	Operations	Fatalities
Subtemporal Decompressions ..	33	37	2
Subtemporal Explorations ..	8	8	0
Subfrontal Explorations ..	5	6	1
Transphenoidal Decompressions	16	16	3
Transphenoidal Extirpations ..	52	58	4
	<hr/> 114	<hr/> 125	<hr/> 10

Thus there was a total operative mortality of 8 per cent and a case-mortality of 10.5 per cent. Moreover, in the 74 operations in the two transphenoidal groups there have been 7 fatalities (9.5 per cent), most of them occurring in the earlier series.

Küttner² records his experiences and results in one hundred operations for the relief of *brain tumour*. He considers the diagnostic brain puncture of Neisser and Pollak as a great step forward, and its slight danger should not weigh too heavily against its marked advantages. More particularly, we should not overestimate the danger of hæmorrhage. At the necropsies in two cases he noted that the median meningeal artery had avoided the puncturing needle, and in another case the needle had even perforated the transverse sinus without causing a hæmorrhage. He has occasionally observed a direct rise of pressure in connection with brain puncture which necessitated immediate operation. From this he learned the lesson that diagnostic

brain puncture should be performed only under conditions which permit immediate trephining, should this become necessary. Palliative trephinings over the central region or in its neighbourhood, for instance, in disease of the posterior frontal or temporal brain, were in some cases followed by contralateral paresis or complete paralysis. This annoying complication has been experienced by many other operators. In some of the cases it subsided in the course of a few weeks; in others, however, improvement unfortunately does not take place. Repeatedly the decompression was not successful. When, for example, in disease of the posterior cranial fossa, the decompression defect is placed over the cerebrum, and vice versa, the designed relief (collateral drainage) is not obtained. In such doubtful cases it might be well to decompress simultaneously both above and below the tentorium; this is possible in the occipital region, where two opposing door-wing flaps of the dura could be formed, with the transverse sinus as a temporary base.

He has seen nothing that is gratifying from puncture of the corpus callosum and ventricular drainage. In one case, at necropsy seven weeks after puncture of the corpus callosum, the opening was found completely healed, and in another, eight weeks after operation, it could no longer be found at all.

As regards the technique of trepanation for brain tumour, Küttner prefers the two-stage procedure, even in palliative operations, unless acute symptoms of brain-pressure demand immediate opening of the dura. The introduction of local anæsthesia with 0.5 per cent solutions of novocain-suprarenin has, in his clinic, been welcomed as a great advance. One can always operate on the sitting patient, respiration is free and under easy control, and no special hæmostasis is necessary for the scalp. In sensitive patients an ostensible narcosis is introduced which, however, remains so superficial that conversation can be carried on with the patient. Among the 104 surgical interventions performed at the Breslau clinic on 100 patients within the past six and a half years, the tumour was removed in 30 instances; 45 patients died as a result of the operation and its complications.

† Cushing,³ in the discussion of Prof. Küttner's paper, presents an interesting analysis of his own series of cerebral tumours and the results of surgical intervention. Speaking of recoveries, he says that probably none of us see more than a possible 5 per cent of our patients who are completely cured. If we rest content with some persistence of symptoms after a tumour removal, possibly an additional 10 per cent are in this sense cured, and the individual may lead an effective life, just as he may on recovery from a minor apoplexy which has possibly left some permanent trace of its occurrence. However, if satisfied with alleviation of suffering, preservation of vision, and prolongation of life in relative comfort and usefulness, often for many years, certainly 50 or 60 per cent of all patients can thus be helped. But in any event, even under the most favourable surroundings and with the widest experience and greatest skill, it may be

expected that 15 or 20 per cent of the cases will continue helpless from an uninterrupted progression of symptoms, and that a possible 10 per cent will succumb to the operation, owing usually either to unavoidable loss of blood or to pressure implication of the respiratory centre, which, as all have observed, is particularly apt to occur after subtentorial manipulations.

Cushing's experience comprises 334 cases observed in Baltimore and 142 in Boston during the past eighteen months. Out of the Boston series, 37 of which were hypophysial tumours, 136 have been operated upon, and concerning these the following facts may be given. Excluding certain cases, there was a case-mortality for 130 patients operated upon of 8.4 per cent, and an operative mortality for the 149 operations of 7.3 per cent. The following assemblage of the 149 individual operative procedures for the entire series may be given :—

Subtemporal decompressions, 41 (no fatality).

Osteoplastic craniotomies combined with cerebral decompression, 28 (3 fatalities).

Osteoplastic craniotomy with attempted partial or total removal of the tumour, 24 (2 fatalities).

Transphenoidal operations for hypophysial tumour, 17 (1 fatality).

Suboccipital exploration and decompression, 22 (3 fatalities).

Suboccipital operations with attempted partial or total removal of the lesion, 17 (2 fatalities).

William Thorburn⁴ reviews the present position of cerebral surgery with especial reference to epilepsy and tumour. In common with most surgeons of experience, he regards operative intervention in idiopathic or genuine epilepsy as useless, and advises operation only in those cases with traumatic cranial defect or with focal symptoms (Jacksonian epilepsy). As a rule he is averse to the removal of cerebral cortex. In one case, however—an old bullet wound of the brain,—a cure was effected by the removal of the diseased portion of the cortex. In the last thirteen years he has performed 39 operations for various types of epilepsy other than those connected with such gross lesions as tumours and abscesses, the results being as follows : Of the total number, there could be traced to date 24 cases. Of these, 5 were under two years' duration, and 19 were over two years'. The results in cases of over two years' duration were : cured, 5 ; greatly improved, 6 ; improved, 2 ; not improved, 6.

Operations for cerebral tumour were performed on 57 cases. Of this number, 24 died within a month, 14 within a year, and 10 had survived the operation a year or longer. Nine cases were untraced.

In conclusion, he says that somewhat less than 25 per cent of all cases may be regarded as cured, or at least as enabled to survive a highly fatal disease for a long period. Such a figure is perhaps not encouraging, but can we reasonably expect more ? We must remember that the great majority of cerebral tumours are malignant. Many are sarcomatous or gliomatous. Some are tuberculous, which, like

malignant growths, tend to recur, and are not rarely multiple. Innocent fibromata, endotheliomata, and cysts are comparatively rare. Hence, also, we need have no hesitation in advising early decompression in every case of cerebral tumour. It is useless to wait until the patient is already blind, and the first onset of pressure symptoms should be the signal for this relief. If the operation for such relief exposes an accessible tumour, so much the better; but we must not wait for its localization. And if this be done we shall save much suffering and prolong many lives, at the cost of a surgical intervention which is almost trivial.

Cerebral Spastic Paralysis.—Sharpe and Farrell⁵ advocate the operation of subtemporal decompression in selected cases of cerebral spastic paralysis of the hemiplegic, diplegic, and paraplegic types. The chief indication for this procedure they find in slight, but to the authors distinct, signs of an increase of intracranial pressure in the optic nerve, viz., distention of the retinal vessels and blurring of the nasal margin of the papilla. In 201 cases of cerebral palsies, 65 showed these slight but positive signs with the ophthalmoscope, and were subjected to a decompressive procedure, sometimes unilateral, often bilateral. The results have on the whole been encouraging. There has been a distinct improvement in the spasticity, and in the mental condition as well. The operation frequently reveals cysts, adhesions, thickenings of the meninges, or a brain under increased pressure. [It has been the writer's privilege to see a number of these cases and the post-operative results, and they are encouraging. The operation is one to be considered in certain cases, and although the ophthalmoscopic changes are slight, and somewhat doubtful in the writer's judgement, it may be that they have the value which is attributed to them by Sharpe and Farrell. It has, however, seemed to him that the favourable results are due to a lowering of normal intracranial pressure, breaking up of adhesions, relief of cysts, etc., in this way diminishing the cerebral stimuli tending to increase or maintain the spastic state; in other words, accomplishing by the cerebral route what Foerster has obtained by spinal decompression and rhizotomy, viz., a diminution of irritative stimuli.—J. R. H.]

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1914, ii, 1515; ²*Ibid.* 1530; ³*Ibid.* 1915, i, 189; ⁴*Med. Press and Circ.* 1914, ii, 424; ⁵*Jour. Amer. Med. Assoc.* 1915, i, 482.

BRAIN, TUMOUR OF. (See also AUDITORY NERVE.)

BREAST, CANCER OF.

W. I. de C. Wheeler, F.R.C.S.I.

Little or no attempt has been made to educate the public as to the importance of early recognition of cancer. It would be a simple matter to advertise the possible consequences of neglected, painless swellings in the breast, and thus put potential victims on guard. The fundamental fact that cancer is at first a local and often painless disease, only curable by early removal, should be taught broadcast.

Armstrong¹ discusses the results of operation for malignant disease of the breast, and presents 102 cases of mammary tumour for examination. Of these, 87 were carcinoma, 2 sarcoma, 13 fibro-adenoma. Of the carcinoma cases, 5 were inoperable and 2 refused operation. The complete operation was performed on 82 cases. It was possible to trace 65 of these, and 33, or 50 per cent, were alive and well three years after operation. Assuming all the untraced cases died of recurrence, the mortality is about 60 per cent. If the present series of 87 cases be added to 63 previously reported by Armstrong in 1907, and the results analyzed, the figures point to only 30 per cent of the patients being alive and well three or more years after operation.

The complete operation was performed in every case; that is to say, the whole breast was removed, together with both pectoral muscles, the glands in the axilla and the fascia covering the serratus magnus, the anterior border of the latissimus dorsi, and the upper portion of the external abdominal oblique. This operation is a safe one. Only 1 death occurred in 150 cases, and this was traced to an error in technique; infection followed operation and proved fatal. No disability follows removal of the sternal portion of the pectoralis major and the pectoralis minor. A case is mentioned in which the pectorals on both sides were removed and the woman subsequently earned her living as a charwoman.

Russell Howard² points out that although cancer of the breast cannot be considered a common disease, there are some interesting conclusions which can be drawn as regards the proportion to other tumours of the breast. Thus, when he had collected 100 cases of cancer, he had only operated on 36 cases of other varieties of tumour. The youngest patient was 23 and the oldest 78, the average age being 47. In none of the 100 cases was there a definite history of injury. This is at variance with the opinion of J. B. Murphy, who considers injuries of moderate severity to be a distinct predisposing cause of cancer of the breast. In other words, cancer of the breast resembles sarcoma of other organs in being preceded by a slight trauma. The relationship of cancer and adenoma is uncertain, since adenomata are nowadays removed as soon as they are diagnosed; but one case of adenoma, diagnosed sixteen years previously, still retained its innocent characteristics, and there were no microscopical signs of carcinoma. It may be concluded from pathological evidence that cancer frequently arises in a patch of chronic interstitial mastitis. A carcinomatous breast frequently shows evidence of chronic interstitial mastitis, and on the other hand, cases of mastitis after examination show early microscopic signs of the presence of a carcinoma. In 67 per cent of the cases the lump in the breast was discovered by accident. The absence of pain, as in cancer elsewhere, is responsible for late diagnosis. In cases of chronic interstitial mastitis, on the other hand, pain is often a marked feature. As a general rule, it may be stated that the more the patient complains of pain the less dangerous is the condition.

Howard has had under his care three patients suffering from spontaneous fracture due to secondary cancer of the bones. All three patients had been aware of a lump in the breast for some months, and had not sought advice because it was painless. It must be understood that all the text-book signs of cancer of the breast are late signs. If a woman over thirty has a solitary lump in the breast, cancer is by far the most likely diagnosis, and almost certain if the lump alters the contour of the breast. The diagnosis of cancer is none the less likely because the lump is free and movable. Of the 100 reported cases, 2 had carcinoma in each breast, and in 5 recurrences occurred in the other breast after removal of one for cancer. When the usual text-book signs are present, the diagnosis can be made at a glance, but the differential diagnosis from other tumours, and especially from chronic interstitial mastitis, is sometimes impossible in early cases.

In doubtful cases immediate microscopic examination of a frozen section is the ideal procedure, and if this cannot be done, American surgeons recommend the complete operation, because the case is more likely to be cancer than not. Howard thinks that this immediate microscopic examination is not always practicable, and so if he thinks the case is probably cancer he performs a complete operation; but if probably mastitis, he waits for a microscopical report and performs the second operation.

The prognosis after removal of the breast should be given with great caution. One of the patients in this series was a woman, age 28, who was pregnant and had a huge cancer growing rapidly. Five years after removal she was well, with no sign of recurrence. Another case, a woman, age 50, had a small scirrhus growth with no palpable glands in the axilla. The complete operation was performed, and a year later she had extensive recurrence all over the skin of her chest.

Howard comes to the following conclusions: (1) These cases are usually seen at a late stage owing to the absence of pain; (2) There is difficulty in diagnosing between early carcinoma and a patch of chronic interstitial mastitis; (3) Convalescence after the operation is rapid; (4) Only a slight amount of inconvenience follows operation; (5) The prognosis in any particular case is difficult.

Howard has tried the effects of **Radium** in two inoperable cases without result. It has given its most favourable results if introduced into the growth by means of large hollow needles in which the radium emanation is contained in capillary tubes. Temporary improvement has followed applications of **X rays** in cases of recurrence.

W. L. Rodman³ considers that cancer of the breast is only second in frequency to stomach cancer. He points out that late diagnosis cannot be atoned for by a more extensive operation, as operative measures have been carried to the furthest possible limit. Efforts should be in the direction of earlier diagnosis, and all malignant lesions should be removed. He insists that cancer begins always as

a strictly local disease, and all depends on the thoroughness of its removal. He thinks that cutting into a growth, removing a part, and submitting it to a pathologist who gives his report at the end of a fortnight, is a practice to be deprecated. The whole tumour should be removed, and an immediate report given from frozen sections. In this paper it is stated that 25 per cent of the patients with axillary involvement are cured by operation, and 80 per cent when there is no such involvement. Partial operations in chronic cystic mastitis are rarely justified in those who have reached the age of forty, and should not be practised at all, even in younger women, unless after microscopic examination.

Sampson Handley⁴ records a legally established case of traumatic carcinoma of the breast. The patient fell over a beam, injuring the left elbow and breast. About two months later she noticed a discharge from the left nipple and a small lump in the left breast. This rapidly developed into an extensive malignant tumour, which was removed about five months after the original injury. Handley reported that in his opinion the injury was an essential factor in the causation of the subsequent growth, though it is probable that the patient was previously predisposed to the disease. It is generally conceded that sarcoma, especially of bones, follows slight injuries, and that carcinoma follows constant slight irritation such as is seen on the lip or tongue. There is much evidence, however, to show that the breast is an exception, and that slight injuries, or injuries of moderate severity, are followed by carcinoma. In Handley's case the jury found for the plaintiff an award of £200 damages.

REFERENCE.—¹*Brit. Jour. Surg.* 1915, July, 39; ²*Pract.* 1915, i, 742; ³*Jour. Amer. Med. Assoc.* 1915, i, 707; ⁴*Pract.* 1914, ii, 788.

BREAST, TUBERCULOSIS OF. *W. I. de C. Wheeler, F.R.C.S.I.*

Alexander Miles¹ comments on the fact that the human breast is singularly seldom effected with tuberculosis. He points out that apart from the cases infected from tuberculous lesions of the ribs or pleura, the usual mode of infection is through the blood-stream.

The disease generally begins in the acini of the glands rather than in the connective tissue or ducts. Six cases are described in this paper. In the first case attention was drawn to the breasts by a gradual recession of the right nipple, followed by a white milky discharge. There was no swelling to be detected until two years later, when the breast became swollen and painful. There was a hard swelling about the size of a hen's egg which could be felt in the lower and outer quadrant. Ten years previously the right leg had been amputated for tuberculous disease of the knee, and this assisted in the diagnosis of tuberculous mastitis, which was confirmed by microscopic examination. In a second case, with an old history of abscess, a large firm mass was found occupying the central part of the breast; the nipple was markedly retracted, and close to it was a sinus from which blood-stained pus could be pressed. The axillary glands were

large, soft, and tender. The affected area was excised locally, and a microscopic examination proved it to be tuberculous in origin. The average age of the six patients reported by Miles was about thirty-seven.

REFERENCE.—¹*Edin. Med. Jour.* 1915, i, 205.

BROMIDE ERUPTIONS.

E. Graham Little, M.D., F.R.C.P.

King Smith¹ reports two cases of the granulomatous type of eruption less commonly seen as the result of taking bromides, and the clinical aspects of the eruption are illustrated in two excellent photographs. The granular bleeding surface presenting numerous minute abscesses is very characteristic, but it may closely simulate a tertiary syphilide, blastomycosis, and even tuberculosis cutis. The rapid improvement of the affected areas when the drug is stopped affords strong presumptive evidence of the nature of the causation. Antiseptic Dressings applied to the patches and the administration of Arsenic may hasten its disappearance.

REFERENCE.—¹*Canad. Pract. and Rev.* 1915, 159.

BRONCHITIS.—Vaccines in (pp. 36, 37. See also Vol. 1915, p. 185.)

BROMIDROSIS.

E. Graham Little, M.D., F.R.C.P.

Benians¹ recommends the application of Glycerin to the affected feet, which should be well anointed with it daily before putting on the socks. Three applications were effective in curing two very severe cases. The explanation offered for this result is that glycerin, while not inhibiting the growth of the bacteria which are probably the chief factors in causation, prevents the formation of indol and other end-products of protein destruction, and substitutes a faintly acid for an alkaline medium in contact with the skin of the foot. It is further probable that the softening effect of the glycerin on the skin renders it more pliable, and is to be preferred to agents which harden it.

REFERENCE.—¹*Lancet*, 1914, ii, 1301.

BRUISES.—Extract of *Tamus Communis* recommended (p. 34).

BURNS.

W. I. de C. Wheeler, F.R.C.S.I.

Haas¹ recommends that the treatment of burns in children should be carried out without dressings, and exposed to the air. The patients are placed in bed upon a clean sheet and the burned parts are left uncovered; the other parts of the body are well covered. In warm weather it is necessary to keep the entire bed well covered with mosquito netting to keep flies from the wound. Opium in some form is usually necessary during the first twenty-four or forty-eight hours; but after that, rarely. The bowels are freely moved, and as soon as the patient is hungry a full diet is given. The wound after a short time takes on a very characteristic appearance. Those portions that have suffered only a first-degree burn assume a normal appearance, except for the redness. Burns of second- and third-degree crust over

and, according to the depth, discharge purulent fluid under these crusts, which are lifted up and take on the appearance of rupia. When the exudate beneath the crust is not great, the crust is allowed to remain until it falls off, leaving a reddened, healthy surface without scar. Where the deeper burn produces a large exudation, the scab is lifted until it is loose in nearly all its parts, and a granulating surface bathed in purulent fluid is seen beneath. These crusts should be left as long as possible, but it frequently becomes necessary to remove them and clean the granulating surface thus exposed, by gently mopping with cotton moistened in boracic or other solution. (*Plate VI.*)

The contrast between a burned child treated by this method and one treated by some form of dressing is striking indeed. The terror of the one waiting for the next dressing, and the shrieks which accompany such a dressing, and the comparative air of comfort and well-being of the other are not quickly forgotten. These children lie quietly in bed, present a good colour, smile and play when they can do so without disturbing the burned parts, and take their food with relish. Nephritis would seem to be less frequent than in cases treated by dressings and, when present, to disappear sooner. The pallor and cachexia is not so noticeable as in those treated by dressings.

Herrman² thinks the treatment of burns is comparable in some respects to the present method of treating peritonitis. The keynote is 'hands off.' In the usual method accompanied by local applications, the removal of dressings, besides causing great pain, destroys the protective covering and fine granulations. For preventing the multiplication of the organisms of putrefaction, powdering the parts with **Boracic Acid** has been found very effective. Briefly outlined, the treatment would be as follows: During the first twenty-four hours, if the pain is severe, morphine is administered; after that, the exudated serum covers the nerve endings, and there is little pain if traumatism is prevented. Stimulants, especially suprarenal extract, are given to control shock. The parts are exposed to the air and are well powdered with boracic acid. Elimination through the skin, kidneys, and bowel is increased by using hot air, diaphoretics, high colonic irrigation with hot water, diuretics, and saline laxatives.

Charles A. Parker³ recommends that the treatment of burns from the commencement should take into consideration the probable deformities which will result from cicatrization. "It is a common observation that great deformities and serious interference with function frequently follow extensive burns of the extremities, especially when they involve the regions of joints. Burns of the axillary region leave the contracting scars that draw the arm against the body, preventing, more or less completely, abduction of the affected limb. Burns of the groin cause flexion of the hip on the body. Burns about the elbows and knees produce only flexion deformities, as the flexors practically always overcome the contractures on the extensor surfaces. With the wrist and fingers the same general rule holds true, that burns on the extensor surfaces produce much less interference

with function by scars in these regions. Scars following burns at the ankle are more likely to produce equinus than calcaneus, and lateral deformities are apt to be caused. Burns of the feet and toes are likely to be less serious on account of their deformities than on account of the scar tissue interfering with the normal weight-bearing function. Deep burns involving muscles, joint structures, and bones, or causing complete loss of members, from the very nature of the primary injury, can offer only such imperfect recoveries as are compatible with similar destruction of tissue from other causes. Here the destruction is so great that the muscles and joints are no longer adapted to their proper functions, and even amputation itself may be necessary."

Parker emphasizes the fact that burns of the third degree, however extensive, if compatible with life, may and should heal without deformity and with good function. The first aim should be to obtain rapid healing and thus reduce the amount of scar tissue formed, and the second to prevent the possibility of deformity. The stage of separation of the sloughs—two or three weeks—cannot be materially shortened. He does not approve of the cutting away of sloughs in the early stages as recommended by some, as it adds considerably to the shock, and there is no evidence to show (as urged in some recent literature) that by such a procedure toxæmia is in any way prevented. For the sloughing period plain wet dressings are recommended. After the slough separates skin-grafting may be tried, but is often unsuccessful. With proper management healing may be expected in very reasonable periods of time without the intervention of skin-grafting. Much importance is not attached to the offensive discharges into and under the dressings in cases of burns, and adhesive strapping dressings are used in much the same way as applied to extensive ulcers of the leg (*see Plate VII*). He writes: "When the slough is removed, it is my practice to treat the wound, an ulcer, with adhesive plaster strips until it is finally healed. This does not interfere with skin grafts that can be laid under the strips if desired, but is used principally where grafting is inefficient or cannot be used, that is, in the large class of burns left wholly or partially without an epidermal cover. Of course there is a flow of pus from inside the plaster when it is opened, but there is very little left remaining on the limb, as it is so fluid it comes off with the plaster and drops from the limb itself. Such as remains on the healthy skin is sponged off, and the plaster is renewed in the same manner as it was first applied. Antiseptics must not be used in any manner that might result in their touching the wound itself, for they can only do harm in destroying new epidermal and other cells that are so necessary for healing. The wound will always remain infected, and must be healed under that condition rather than abused under the impression that it can only be healed when aseptic or approaching an aseptic condition."

The plaster strapping, it is urged, prevents the growth of exuberant granulations, and thus encourages the ingrowth of epithelium from the margins. The strapping lifts off the moist surface without pain

PLATE VI.

HAAS'S TREATMENT OF BURNS WITHOUT DRESSINGS

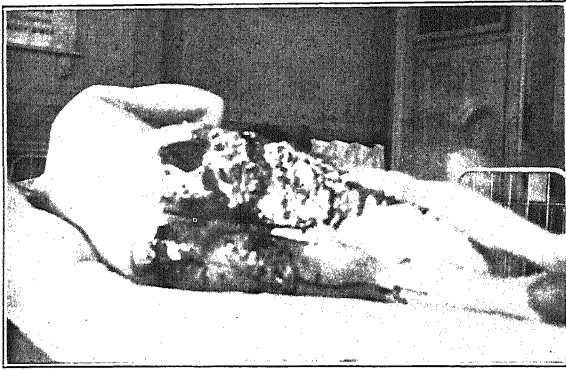


Fig. A.—Burned by flame November 26, 1914; second and third degree.
Appearance December 12, 1914.

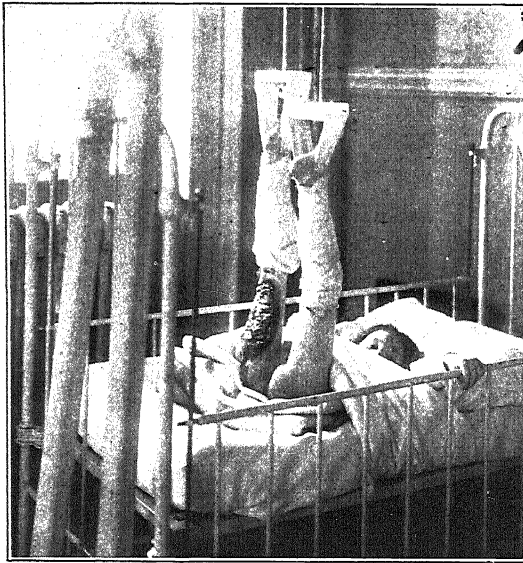


Fig. B.—Appearance January 9, 1915.

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PLATE VII.

CHARLES A. PARKER'S METHOD OF TREATMENT OF BURNS

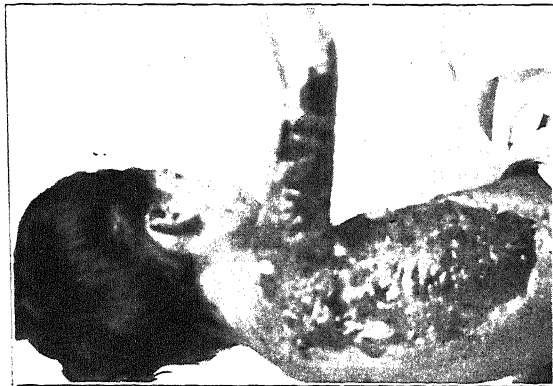


Fig. A.—Showing extent of burn

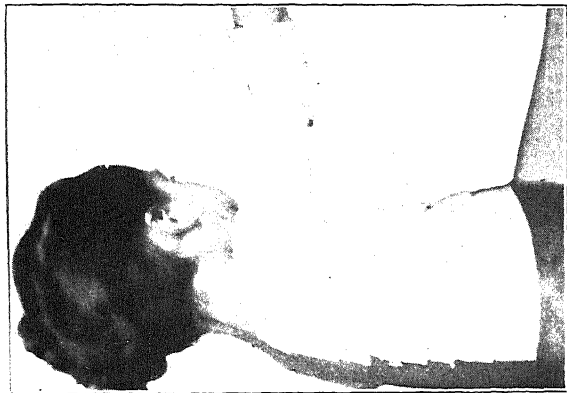


Fig. B.—Method of applying adhesive plaster.



Fig. C.—Completed dressing with removable plaster-of-Paris splint. Three weeks after injury.

Kindly lent by the American Medical Association

or bleeding, and the ease with which it can be applied and changed may be a determining factor for recovery or death, especially in children. Drops of serum taken at a change of dressing have been found sterile in some instances, showing the propensity of tissues to take care of themselves when put under the best physiological conditions for resistance.

In order to anticipate the deformities in burns in the neighbourhood of joints, removable plaster-of-Paris casts are employed. As a general rule, the limbs should be held with all joints in extension, the arm abducted from the shoulder, the elbow, wrist, and fingers extended, and the lower limb in a straight line with the body, the ankle at right angles to the leg, and the toes extended. Burns on the extensor surfaces only seldom cause deformities or much limitation of motion, and give considerably less concern in treatment; yet they heal much more rapidly when kept free from motion. In fact, fixation is one of the most important factors in securing rapid healing.

Plaster of Paris has served in Parker's hands for fixation of any part of a limb. After a burn is completely dressed, a circular plaster-of-Paris splint is applied with the limb in the desired position. When this is hard, it is cut into halves or in such manner that it can be removed for dressing, after which it is reapplied and thus used throughout the healing, if it is six months, or a year or more. For the shoulder and axilla, a cast around the body with an extension laterally and upward for the arm, was used effectively throughout a period of six or seven months. The arm-piece had a removable upper portion, and the body-piece was opened on the side opposite the abducted and extended arm. This was easily removed for dressing and reapplied after its completion. For burns of the groin, the body and affected limb should be similarly controlled during the healing.

REFERENCES.—¹*Amer. Jour. Surg.* 1915, i, 61; ²*Ibid.*; ³*Jour. Amer. Med. Assoc.*

CANCER, PYREXIA IN.

Herbert French, M.D., F.R.C.P.

The fact that when there are secondary deposits of carcinoma in the liver the patient is apt to have evening pyrexia in the absence of any obvious pyogenic infection is familiar; it is less commonly recognized that pyrexia without secondary pyogenic infection may be a pronounced feature of cases of malignant disease in general.

Phillips¹ has drawn fresh attention to this point by recording an instance of adenocarcinoma of the kidney in which there was prolonged pyrexia. He quotes from Freudweiler, who has studied this matter fully on a basis of 475 cases of definitely established malignant disease, to the effect that fever of some kind is noted in nearly 40 per cent of all cases. The commonest type is remittent and intermittent fever. Other cases exhibit long-continued fever, malarial paroxysms, or occasional bouts of fever. The highest incidence of pyrexial cases was in malignant disease of the liver and gall-bladder, but a fair pro-

portion of cases of cancer of the stomach and intestine are febrile. The cause of pyrexia in malignant disease is unknown.

Autolysin a much-vaunted 'cure' (p. 3). **X-ray treatment** (p. 56). **Radium** (p. 59). **Diathermy** (p. 66).

REFERENCE.—*Amer. Jour. Med. Sci.* 1915, ii, 193.

CARCINOMA, BLOOD-CELLS IN.

O. C. Gruner, M.D.

The character of the blood-cells in carcinoma has been studied by various observers, and reference to some cell-forms, as well as to the existence of daily variation of cell-count in lymphosarcoma, were recorded in the *MEDICAL ANNUAL*, 1915, p. 155.

The accompanying plates depict some of the finer cellular changes which are to be made out in the blood cells in many cases of malignant

EXPLANATION OF PLATE VIII.

LEUCOCYTES IN PERNICIOUS ANÆMIA.

The four upper rows present different forms of neutrophile leucocytes, the lower two rows show mononuclear cells.

The examples are selected from different specimens of pernicious-anæmia blood to show different types of nuclear deformity commonly met with in this disease. (They should be contrasted with the types shown in the upper two rows of *Plate IX*.)

Rows 1 and 2 show marked polymorphism of the nucleus, the effect being produced: (a) By marked beading; (b) By extrusion of pyriform and rod-like processes of nuclear matter; (c) By S-like coiling of the nucleus. The two first-named characters are particularly noteworthy.

Rows 3 and 4 show juvenile and dying forms; cells 11 and 12 are juvenile leucocytes (thick, rather pale, massive nuclei). Cells 13 and 14 show less bulky nuclei, while tortuosity or coil-formation is present. Cells 15-18 are dying cells of different forms. The first two are cells with horseshoe nuclei; the other two are multipartite. The nucleus shows a different colour (more oxyphile), the cell-outline is less evident, and cell granules are less conspicuous. Cell 19 is introduced to show two kinds of pseudopodic excrescence from the nucleus: (a) Pointed; (b) Blunt and sessile. The linear arrangement of the ferment granules is also shown.

The last two rows illustrate cell-types not infrequently met with in this kind of blood. Cells 20 and 21 are large mononuclear leucocytes with bright azurophile ex-nuclear lines. In the one case a rounded cluster of azurophile granules, such as are seen in platelets, is being formed. Cells 22 and 23 are typical small lymphocytes, the second example being of the 'naked' type so common in pernicious anæmia. 24 is a large mononuclear of leucocytoid form, showing a fat drop in the nucleus and another in the cell-substance. 25 and 26 are dead and dying mononuclear cells. 27 is a hyaline leucocyte (leucocytoid micromonocyte) with a few minute azurophile granules.

Summing up the hæmatological characters of this blood, we have: (a) Bizarre nuclear forms, with abundant ex-nuclear pseudopods; (b) A preponderance of multifid forms; (c) A number of dead and dying leucocytes, which gives the phenomenon of leucocytolysis, and indicates the existence of leucocytotoxins in the circulating blood; (d) Evidence of lymphocytolysis; (e) Presence of very juvenile lymphocytes.

disease. The changes met with in pernicious anæmia are shown by way of contrast.

The findings are collected together on the principle that a blood-count in the accepted manner is relatively valueless, whereas a careful study of the individual cells gives considerable insight into the chemical character of the blood-stream, as well as into the cytological changes in the tissues. The existence of many forms of neutrophile which roughly conform to the types depicted in each plate respectively afford very helpful, though not absolute, evidence. It must be understood that one does not diagnose 'pernicious anæmia' from the leucocyte forms of *Plate VIII*; one diagnoses (a) abnormal or excessive purin (?) substances + toxic bodies in the circulation. These two circumstances are commoner in a 'severest anæmia' of non-cancerous origin than in a severe cancerous anæmia. Other evidences being present, the clinical diagnosis becomes simple.

PLATE VIII.

LEUCOCYTES IN PERNICIOUS ANÆMIA

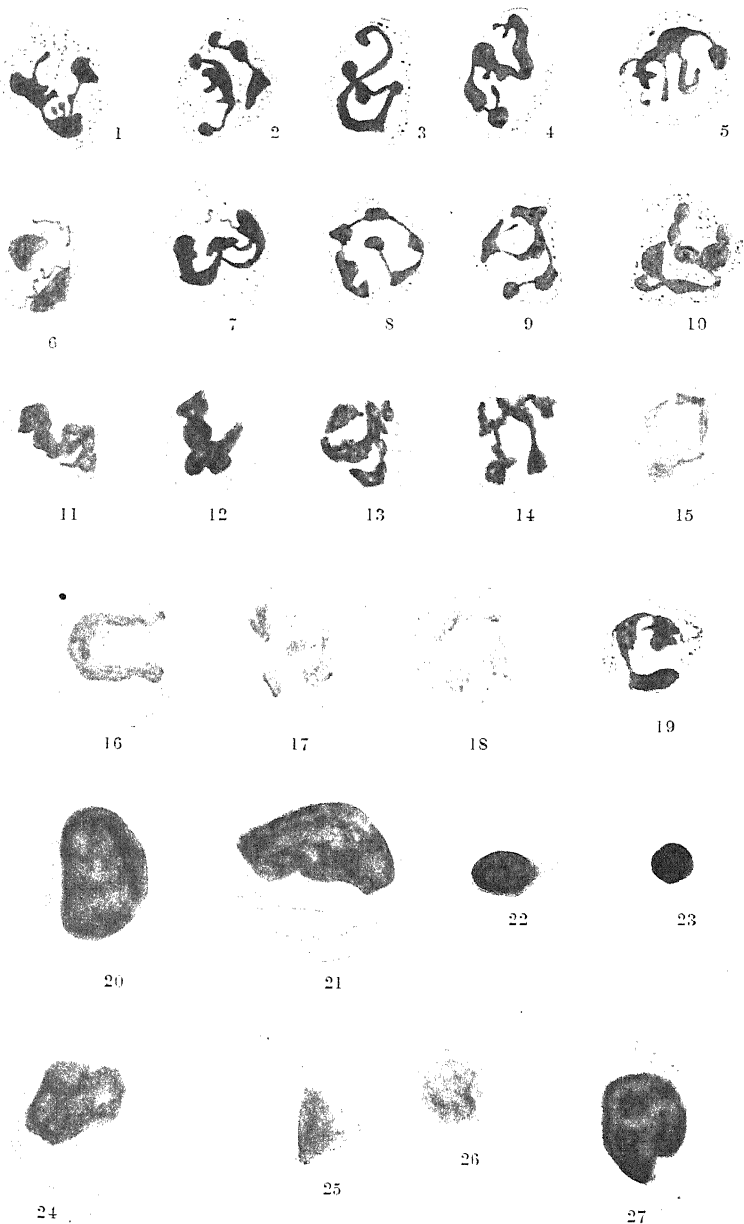
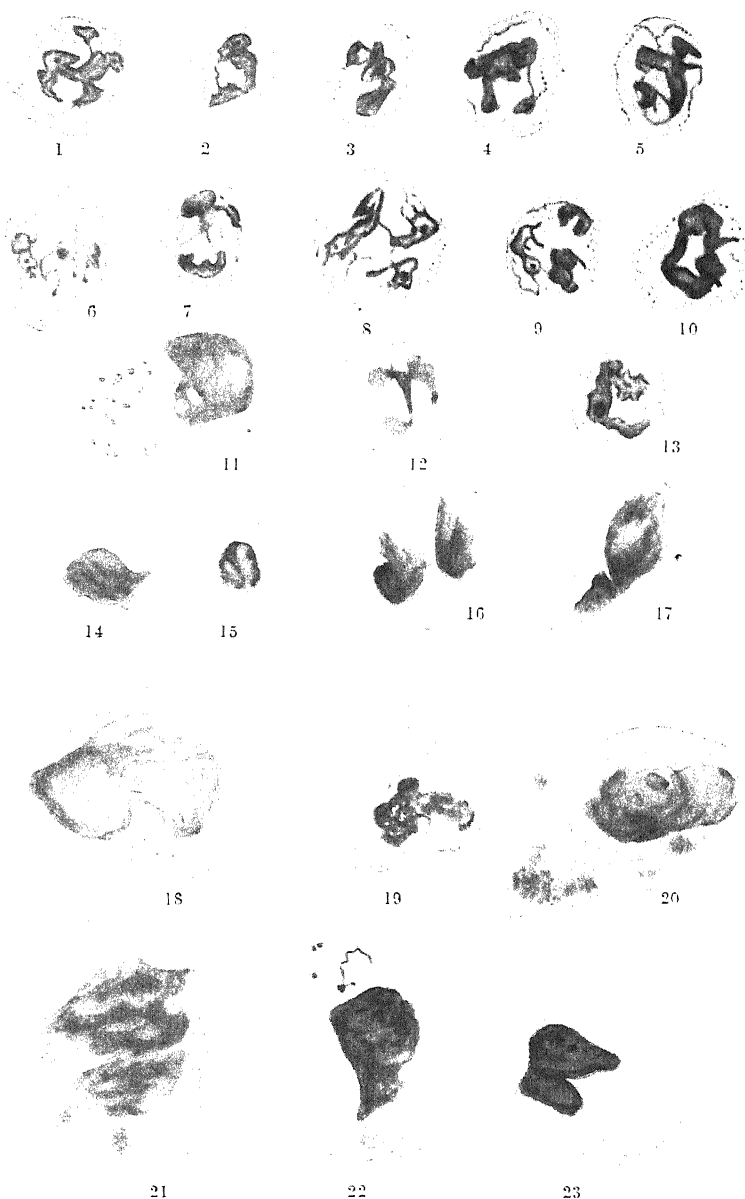


PLATE IX.

LEUCOCYTES IN CARCINOMA OR SARCOMA



Similarly one cannot diagnose cancer from the neutrophiles in *Plate IX*. One diagnoses, again, some form of abnormal purin (?) metabolism in the leucocytes. This may be produced by certain forms of diet. But if we find these aberrant nuclear forms + marked leucocytosis + bizarre forms of large mononuclear leucocyte + amœboid movement of the lymphocytes, one would think at once of malignant disease. On the other hand, if the tumour is not large, if it is circumscribed by fibrous tissue (scirrhus), if secondaries are not abundant, then the blood may show none of the changes in question. The reason of this is obvious. It is that the tumour is not

EXPLANATION OF PLATE IX.

LEUCOCYTES IN CARCINOMA OR SARCOMA.

The cells figured are selected forms from different cases of malignant disease. Cancerous anæmia occasionally simulates pernicious anæmia hematologically. The drawings given in these two plates illustrate the fine differences in the blood-picture in the two diseases. Again, carcinomatosis may simulate sarcomatosis clinically. The cell-types here shown indicate that it is possible to decide between the two diseases (within limits).

The main characters of the neutrophile leucocyte shown in cells 1-10, 13 are: The amblychromatism of the nucleus. The outline comes out sharply, but the nuclear substance is pale, and there are frequently nucleolar bodies within (1, 2, 3, 6, 8, 9, 13).

The nuclear outline tends to tail off into slender processes which give the outline a bizarre form. Pyriform excrescences are well shown in 6. The ring form in 10 is frequent in carcinoma.

The last three rows, as well as 11, are mononuclear cells of different kinds. The most striking feature is the frequency of amitosis in the circulating cells (16, 17, 21, 23). 17 shows a characteristic unequal division of the nucleus. This is seen to a less marked degree in 23.

14 and 15 show two lymphocytes, characteristically in an amœboid position. It is said that lymphocytes do not undergo amœboid movement. It is, however, a very striking phenomenon in cases of sarcoma.

18 is a large mononuclear leucocyte of irregular form with a nucleus whose outline tends to be blurred from the formation of successive overflow layers. This feature, with the fine azur granulation, is almost characteristic of sarcomatosis. 19 is a similar cell, except that the overflow effect covers a larger area than the actual nucleus. 20 is a cell whose cytoplasm is continuous with a polymorphous platelet mass, indicating some definite relationship between the two. 21 shows three collections of azurophile granules proceeding from the nucleus, and evidently about to be discharged from the cell.

22 shows an amœboid lymphocyte with a spiral body ending in a vacuole. Such spiral bodies are frequently met with in blood of carcinoma cases, and were at first thought to be spirochaetal in nature. This view appears to be unsupported by further observations. 23 is a leucocytoid monocyte undergoing unequal amitotic division.

11 shows a large hyaline cell whose cytoplasm contains many vacuoles in which are bright azurophile diploid bodies. These have been supposed to be purely secretory or degenerative. The possibility of their being a phase in the life-history of a parasite is by no means disproved.

(Staining method in each plate: Pappenheim's method. Magnification 1000 and upwards.)

pouring out abnormal substances into the blood-stream, substances of which these leucocytic changes are visible and more sensitive expression than even refined biochemical methods.

	Leucocytes present in pernicious anæmia	Leucocytes present in malignant disease
Number	Much diminished ..	Much increased
Preponderant cell ..	Lymphocyte	Neutrophile (some- times, large mono- nuclear)
Neutrophiles	Bizarre, trachychroma- tic	Amblychromatic, often bizarre
Dying cells	Frequent	Not so frequent
Lymphocytes	'Naked' forms com- mon	Amœboid forms occur

CATARACT.—(*Vol. 1915, p. 187.*)

CEREBELLUM, DISEASES OF.

J. Ramsay Hunt, M.D.

In recent years considerable advances have been made in our knowledge of *cerebellar symptomatology and localization* under the leadership of Babinski, Rothmann, Bárány, Bolk, and Van Rynberk. Mills and Weisenburg¹ have lately contributed to this subject, and their clinical studies are reinforced by kinematographic observations on cerebellar phenomena. They emphasize the fact, thus agreeing with Babinski, that asynergy is the fundamental symptom of cerebellar disease. Cerebellar tremor and the new symptoms, hypermetry, adiadokokinesis, all now recognized as important cerebellar disorders, when reduced to their symptomatic elements, are seen to be dependent in large part if not entirely on loss or disturbance in the power of performing more or less complex movements together for the accomplishment of a definite end.

Luciani's asthenia, atonia, and astasia are to be regarded not so much as special manifestations of asynergy, as derivatives or resultants of asynergic effort. Asthenia is due to the exhaustion which results from efforts to perform movements which cannot be properly grouped and directed. Cerebellar atonia, which is very irregular in its expression, is a relaxation dependent on the fact that tonectic stimuli from the cerebral cortex cannot rhythmically combine with unsynergized movements. Primarily, tone is a cerebral, not a cerebellar attribute.

Attention may be fixed on the views just expressed by the following tabular statement:—

Fundamental Symptom in Cerebellar Diseases—

Asynergy.

Special Symptomatic Manifestations of Asynergy—

Hypermetry

Adiadokokinesis

Tremor.

Symptoms Resulting from Asynergic Efforts—

Asthenia

Atonia

Ataxia.

The cerebellum as a whole, and all of its parts, are concerned with the function of synergia. When, however, a particular part or parts of the body are the seat of abnormal motor phenomena of cerebellar origin, such manifestations are focal and more or less capable of localization.

From their studies of the literature of cerebellar embryology, comparative anatomy, experimentation, and clinicopathology, as well as the results of direct and kinematographic clinical observations, in a few instances reinforced by operations and necropsies, they have attempted a tentative schema of localization in the human cerebellar cortex. This is regarded as only tentative, and in some particulars as merely suggestive, as one cannot, with the same accuracy and

certainty as in the case of the cerebral cortex, indicate this or that region of the cerebellar cortex as exclusively concerned with the movements of the eyes, head, face, jaws, trunk, extremities, or special parts of the limbs.

Under the title "*Dyssynergia Cerebellaris Progressiva*, a Chronic Progressive Form of Cerebellar Tremor," Ramsay Hunt² has described a chronic progressive tremor disturbance, which is dependent upon a disorder of the cerebellar mechanism. This affection is characterized by generalized intention tremors, which begin as a local manifestation and then gradually involve in varying degree the entire voluntary muscular system. The tremor, which is extreme when the muscles are in action, ceases entirely during relaxation and rest. If this disorder of motility is subjected to more detailed study, it will be found that, associated with the tremor, there is a well-marked disturbance of muscle tone and of the ability to measure, direct, and associate muscular movements; the clinical manifestations of this are *dyssynergia*, *dysmetria*, *hypotonia*, *adiadokokinesis*, and *asthenia*. All of these symptoms, including the volitional tremor, which is only the extreme expression of the underlying disturbance of muscle-tone and synergy, indicate a disorder of cerebellar function. He therefore regards this affection, with its progressive tendency, chronic course, and well-defined cerebellar symptomatology, as an organic disease caused by degeneration of certain special structures of the cerebellar mechanism which are concerned in the regulation of the tonus and synergies of muscles.

These cases are further distinguished by the absence of true nystagmus, objective vertigo ('Drehschwindel'), cerebellar fits, vestibular seizures, and disturbances of equilibrium, symptoms which are so frequently associated with gross lesions of the cerebellum. The clinical picture is, therefore, strictly limited to a progressive disturbance of synergic control, the most striking characteristic of which is the ataxic intention tremor which accompanies any movement of the affected part, whether volitional, reflex, or automatic. In its advanced stage the disorder of motility is comparable in severity and violence with that of Huntington's chorea or the generalized athetosis. There is, however, this difference, that in a position of rest and muscular relaxation the tremor movements cease. An analysis of the motor disorder shows a marked disturbance of the ability properly to control and regulate co-ordinated movements. This is shown by the presence of hypermetria, dysmetria, *adiadokokinesis*, *dyssynergia*, *hypotonia*, and intermittent *asthenia*. All these symptoms, including the volitional tremor, coincide with the classical symptomatology which results from a loss of the cerebellar control over voluntary movements. The disorder is, therefore, regarded as of cerebellar origin. The local onset, gradual progression, and chronic course indicate a progressive degeneration of certain special structures of the cerebellar mechanism presiding over the control and regulation of muscle movements.

The diagnosis and treatment of *cerebellar abscesses* have been discussed in a recent paper by Sir William Milligan.³ He states that cerebral abscesses occur twice as frequently as cerebellar. The actual route of infection provides an interesting pathological study. In acute cases the sequence of events is, as a rule, the formation of an extradural abscess in the posterior fossa, or a thrombosis of the lateral sinus with secondary infection of brain tissue, whereas the great majority of chronic cases are secondary to labyrinthine suppuration, the aqueductus vestibuli affording the actual path of communication in nearly 30 per cent, the other usual routes of infection being the result of sinus thrombosis and extradural abscess in relative order of frequency.

Of the many important clinical indications, no one is of more importance than nystagmus, the proper interpretation of which may be the means of securing an accurate differential diagnosis and consequently a correct method of surgical approach to the existing focus of suppuration. Of the two components, the primary or slow is the true vestibular reflex, although in actual practice the direction of the secondary or quick movement is the one which is held to determine the particular type of nystagmus present. When the quick deviation is to the right, the nystagmus is spoken of as a right nystagmus; when to the left, as a left nystagmus. In uncomplicated disease of the labyrinth it is at first directed towards the affected side, but soon changes over and is directed to the opposite or sound side. It remains directed towards the sound side throughout the course of the disease, and as the function of the labyrinth is gradually destroyed, it becomes less and less obvious until finally it disappears. On the other hand, a spontaneous nystagmus, the result of suppuration within the cerebellum, is directed first towards the sound side and very shortly afterwards towards the affected side. It remains throughout the course of the disease directed towards the affected side, and increases, *pari passu*, with the progress of the suppurating focus within the cerebellum. In labyrinthine disease the tendency to fall is always in the direction of the slow component of the nystagmus, in other words, in the direction opposite to the observed nystagmus or towards the affected side, whereas in cerebellar lesions the tendency to fall is independent of the direction of the nystagmus. In certain cases also the presence of dysdiadokokinesis; viz., an impairment of the movements of pronation and supination, is an important indication.

The fact that intracranial suppuration develops as a rule in the immediate proximity of the septic focus to which it owes its origin, and the fact also that labyrinthine suppuration is the proximate cause of cerebellar suppuration in 40 to 50 per cent of cases, naturally suggests that any intracranial abscess which may be present will be found in the lateral lobe of the cerebellum and well forwards. Hence the ideal surgical approach to such an abscess is through the posterior wall of the petrous portion of the temporal bone in the space between the lateral sinus and the internal auditory meatus. Exploration

along this route is much more likely to be the means of discovering an existing abscess than exploration behind the groove of the lateral sinus. Prior to any exploration, however, Milligan is in favour of withdrawing a few drachms of cerebrospinal fluid by lumbar puncture in order to obviate the incidence of sudden arrest of respiration or cardiac failure, a by no means unknown phenomenon in cerebellar lesions. Objection has been made that the withdrawal of cerebrospinal fluid prior to operation, and the consequent decrease of intracranial pressure thereby resulting, may cause a cerebellar abscess, superficially situated, to burst into the meninges. While admitting the possibility, the chances of its happening are very remote if only a few drachms of fluid are removed, whereas not only is the possibility of sudden death during operation from undue intracranial pressure now recognized by all operators, but it has frequently taken place on the operating-table. On the other hand, if too much fluid be withdrawn, the brain stem may fall downwards into the foramen magnum, or may even become twisted.

In his earlier operations the habit was to open the cerebellum behind the lateral sinus. This, unfortunately, frequently missed the abscess, which was subsequently found situated far forwards and inwards in the immediate neighbourhood of the internal auditory meatus. During the last few years he has invariably explored through the posterior antral wall, and has rarely missed finding the collection of pus, which, as a rule, is fairly superficial and at the same time of comparatively small size—small at any rate as compared with temporal lobe abscesses.

Milligan makes a strong plea for the more frequent employment of counter-drainage, which he has found of great service. The objection offered to counter-drainage, viz., that another wound is made in the dura and in the brain substance itself, is quite counterbalanced by the fact that a free path for efficient irrigation is provided, and that the removal of the tube for cleansing purposes is done away with, to say nothing of the practical difficulties frequently experienced in returning the tube to its proper habitat. If the primary opening be made, as already suggested, through the posterior antral wall, the secondary opening should be behind the groove of the lateral sinus, and a tube should be inserted through both openings.

His operative results are as follows: Number of cases operated upon, 27. Males, 17; females 10. Right side, 7; left side, 20. Cured, 17. Died, 10.

The complex of symptoms resulting from *occlusion of the posterior inferior cerebellar artery* is the subject of a report by Gillis.⁴ This artery is usually described as the largest branch of the vertebral artery, and its course as passing obliquely backward around the medulla oblongata, at first between the roots of the hypoglossal nerve, then between the roots of the accessory and the vagus nerves, to end on the inferior surface of the cerebellum. The symptom-complex produced by its occlusion is as follows: sudden onset, with giddiness

and marked tendency to fall to the affected side ; no loss of consciousness ; difficulty with swallowing and occasionally with phonation ; loss of appreciation of pain, heat, and cold over part or the whole of the trigeminal area on one side of the face (usually the side of the lesion), and a corresponding loss of pain and temperature sense over the opposite side of the body from the face down ; touch, tactile discrimination, deep pressure, and muscular sense are intact ; paralysis of the sympathetic on the side of the lesion, causing retraction of the eyeball, contraction of the pupil, and drooping of the eyelid ; ataxia of the arm and leg, usually on the side of the lesion. In the course of two to six months practically all symptoms disappear, other than the sensory changes, which are usually permanent. Although a comparatively rare condition, sufficient cases have been studied to show that the symptom-complex varies very little, especially when the initial symptoms have passed away.

The sudden giddiness and instability in standing or sitting can be attributed to disturbance of Deiter's nucleus and the neighbouring fibres. The ataxia of the arm, or occasionally the hemiataxia, is probably due to interference with the dorsal spinocerebellar tract. The loss of pain and temperature sense over the trigeminal area, usually on the side of the lesion, results from the destruction of the descending or sensory root of the fifth nerve. The presence of touch and pressure sensation in the disturbed area of the face can be explained, as suggested by Woods, by the probability that these sensations, after reaching the Gasserian ganglion, enter the sensory root and go directly into the chief trigeminal nucleus, and thus escape in the destruction of the descending root. Loss of pain and temperature sensation on the side opposite the lesion is due to involvement of the fibres which carry sensation of pain, heat, and cold, these fibres having crossed shortly after entrance to the posterior horns. The retraction of the eyeball, drooping of the lid, and contraction of the pupil, usually on the side of the lesion, show that the sympathetic fibres entering the lower part of the cervical cord do not cross over until they reach the upper part of the medulla. The symptom-complex produced by occlusion of the posterior inferior cerebellar artery is so definite, and usually varies so little, that it should be readily recognized.

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1914, ii, 1813 ; ²*Brain*, 1914, 247 ; ³*Jour. Laryngol. Rhinol. and Otol.* 1915, 1 ; ⁴*Jour. Amer. Med. Assoc.* 1914, ii, 1550.

CEREBRAL DEGENERATION, FAMILIAL, WITH MACULAR CHANGES.

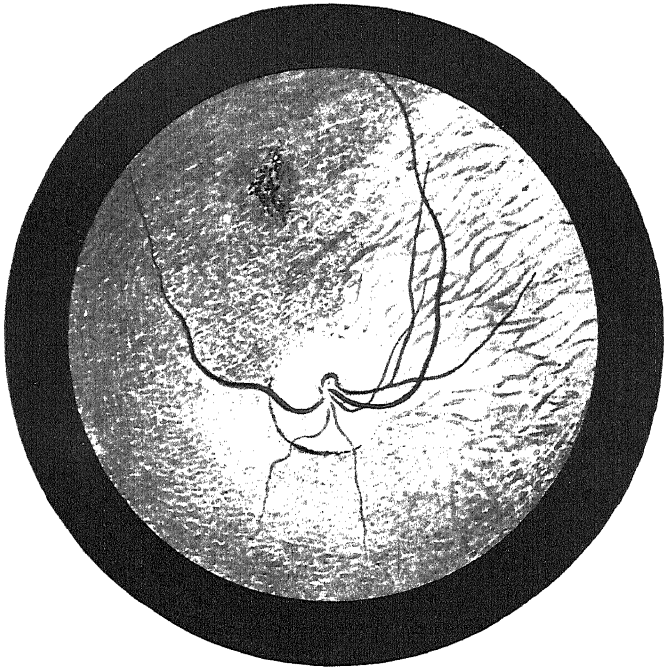
J. Ramsay Hunt, M.D.

Familial cerebral degeneration with macular change (so-called juvenile form of family amaurotic idiocy) is the subject of an interesting monograph by Frederick E. Batten,¹ who reports a family afflicted with this disease, and the pathological changes found in the central nervous system. Certain forms of progressive cerebral

PLATE X

FAMILIAL CEREBRAL DEGENERATION

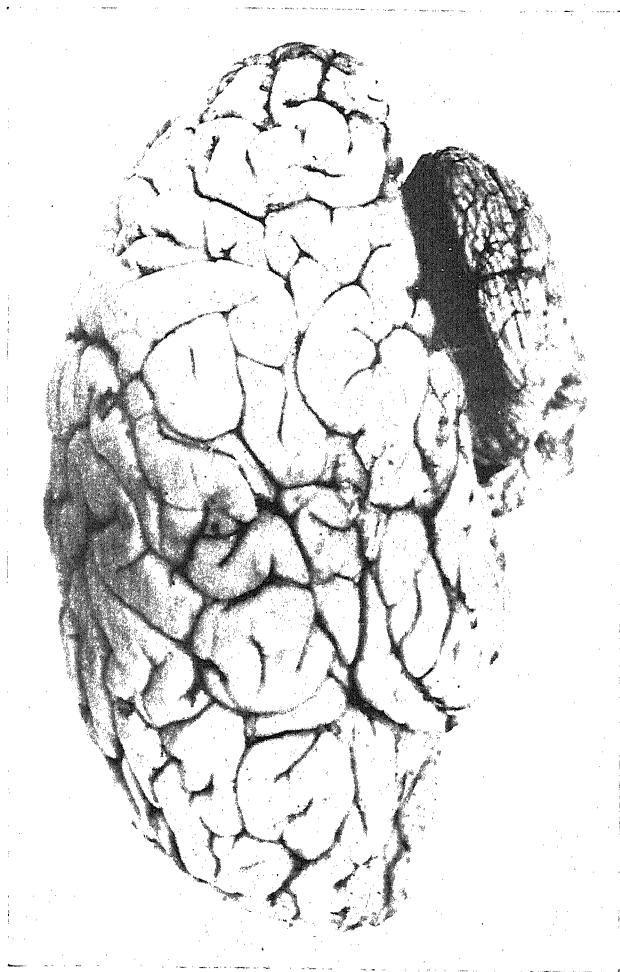
(EALTEN)



Hilda B., age 5½. Fundus of right eye, showing the pigmentary degeneration which occurs at the macular region; a similar appearance was present in the left eye.

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PLATE XI.
FAMILIAL CEREBRAL DEGENERATION—continued
(HATTEN)



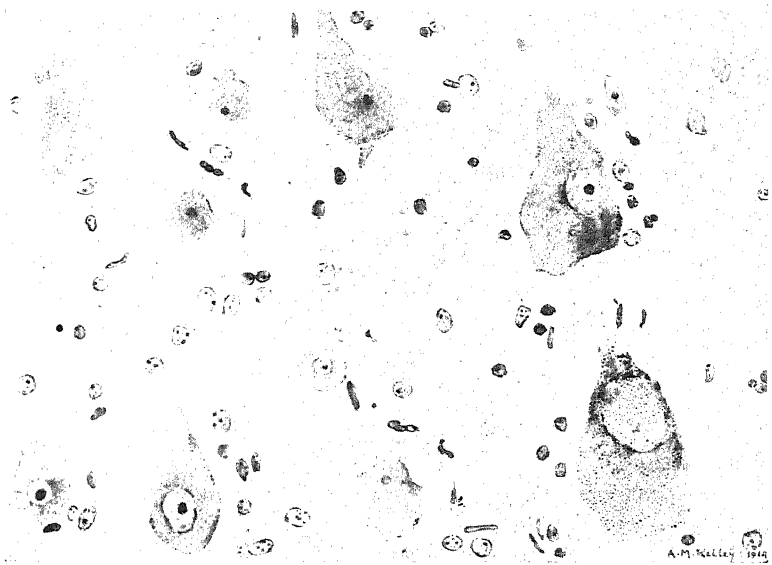
Lateral view of the brain of Jessie B., age 4, showing the normal appearance of the convolutions.

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PLATE XII.

FAMILIAL CEREBRAL DEGENERATION—continued

(BATTEN)



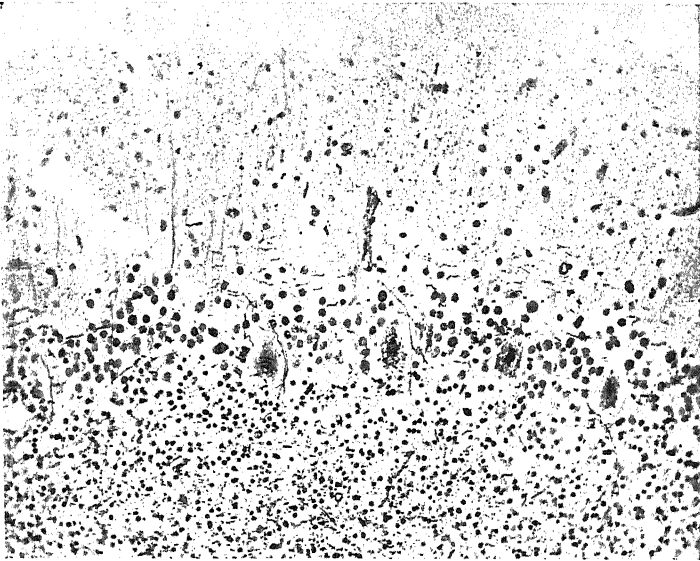
Cerebral cortex, precentral gyrus, of Jessie B., stained by Nissl's method, showing the chromatolytic changes in the Betz and pyramidal cells. The drawing is a composite one in that the cells figured do not all occur in a single field of the microscope. ($\times 800$)

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PLATE XIII.

FAMILIAL CEREBRAL DEGENERATION--continued

(BATTEN



Cerebellar cortex of Jessie B., stained by Bielschowsky's method, showing the degenerate condition of the Purkinje cells, the absence of dendrites, and the layer of large granular cells in the region of the Purkinje cells.

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degeneration occurring in children of one family are generally recognized. That described by Waren Tay and Sachs under the title of 'family amaurotic idiocy' has received careful pathological investigation and is the best known. Some Continental observers (Vogt, Bielschowsky, and others) recognize a late infantile and juvenile form of amaurotic idiocy without the distinctive macular changes, and on pathological grounds they assign these cases to one group, namely, hereditary degenerative disease. Batten's studies confirm the existence of a group of cases showing progressive cerebral degeneration which do not correspond to the clinical features as originally described in the family amaurotic idiocy of Waren Tay and Sachs, and the following division is suggested :—

1. Family amaurotic idiocy—Waren Tay and Sachs.
2. Juvenile progressive cerebral degeneration, with amaurosis, with or without macular and retinal changes.

It has been shown by examination of a number of cases that the pathology of some of these instances of hereditary degeneration, which present different clinical features, is similar, and it seems probable that they may be due to the same toxin, either endogenous or exogenous, and that the variation of symptoms is dependent on variations in age, race, etc. The exact nature of the toxin has yet to be proved.

Batten recounts the history of a family of five children, three of whom were affected with a progressive disease leading to dementia, blindness, and paralysis, one showing changes in the macular region of the eyes (*Plate X*). The children were healthy at birth, and developed in a normal manner until the age of three years and a half. Epileptic fits then occurred, and they began to degenerate. They became noisy, dirty in habits, and developed a spastic condition of the limbs. Death ensued in one child at the age of eight, in another at four, and in the third child at six years. In two cases a post-mortem has been performed. In one, no change was visible in the nervous system macroscopically (*Plate XI*); in the other, only slight atrophy, but on microscopic examination, diffuse degenerative changes affecting the ganglion cells were visible in the cerebrum, cerebellum, and spinal cord (*Plates XII, XIII*). The Wassermann reaction of the blood and cerebrospinal fluid was negative in both cases, and no change in the brain or membrane was found suggesting congenital syphilis.

His conclusions are as follows : It is clear from a consideration of the cases just recorded, and of those which have been described by Vogt, Bielschowsky, and others, that there is a form of familial cerebral degeneration which occurs at a later age, has no race proclivity, and somewhat different clinical manifestations from that described by Waren Tay and Sachs under the title of 'family amaurotic idiocy.' The typical features in these cases are loss of intellectual faculties, loss of vision, loss of motor power.

In some cases all three defects seem to start together and run an equal and concomitant course. In other cases the mental symptoms

first appear, the visual and the motor symptoms remaining long in abeyance. In other cases, again, the visual symptoms appear first, motor and mental symptoms following later or not at all. In some cases the degeneration begins in early life, in others in later infancy, in others, again, in early youth. Some cases pass rapidly to a fatal termination; others are slow in their progress. Some cases show very distinct changes in the macula; others pigmentary changes in the retina, which are not limited to the macula. Others, again, show no fundus change, or do so only in the later stages of the disease. Clinically there is a great variation in the symptoms, and this, together with their time of appearance, forms a basis for classification. Pathologically these cases are essentially the same, and the changes in the cells are strikingly similar in all cases which have come to autopsy.

Later, Batten, in collaboration with M. S. Mayou,² made further pathological studies on two other members of this family, which resulted in the finding of similar changes in the eye and central nervous system. They regard it as established that there is a group of cases similar to the Waren Tay-Sachs family amaurotic idiocy, but occurring at a later age and not race-selective. The disease is characterized by progressive blindness, progressive paralysis, and progressive dementia; but the changes at the macula are not always present, and when present are in some cases a late manifestation, in others an early manifestation of the disease. The later in life the disease appears the less acute seems to be the course, and in those cases in which the visual defect manifests itself during or after the second decade of life there appears to be little or no liability for the central nervous system to be affected. The parallelism of the clinical symptoms with the Waren Tay-Sachs cases is clear. The agreement lies in the familial character, the absence of syphilis, and the clinical symptoms and course. The difference lies in the absence of race proclivity and of the characteristic macular change, and the difference of age. What the nature of the poison may be which is so selective in its mode of action and tends to affect several members of a childship is a problem yet to be solved, for neither the exhaustion theory of Edinger nor the abiotrophy theory of Gowers helps to throw light on the condition.

REFERENCES.—¹*Quart. Jour. Med.* 1914, July, 444; ²*Proc. Roy. Soc. Med.* 1915, 70.

CEREBRAL DIPLEGIA.

J. Ramsay Hunt, M.D.

In 1909 Foerster described an *atonic-astasic type* of cerebral diplegia. This group of cases is characterized by generalized hypotonia of the voluntary muscles, an inability to stand, walk, or even sit without support, and a well-marked mental defect. Pathological examinations in two cases showed extensive sclerosis of the frontal lobes without any affection of the cerebellum. The contrast between the atonic and the more common spastic form of cerebral diplegia is very

striking. Batten and von Wyss¹ report four cases of this curious affection. All four cases have in common a hypotonic condition of the voluntary muscles of the body, especially of the lower limbs, and a deficiency of the synergetic action of the muscles, as shown by the inability to stand or walk. There is, however, no loss of power in the performance of active movements. In two of the cases there was associated a certain amount of hypertonia, as evidenced by adductor spasm and overflow of the abdominal reflexes; in one there was an occasional extensor response of the plantar reflexes. There was also in two cases rigidity of the lower limbs in a certain position, namely, when the children were suspended by the axillæ. Two of the children were mentally deficient and mute. It is interesting to note that, according to the statement of the parents, all of these children have shown progressive degeneration. Three of the children were born as breech presentations. One showed another malformation, namely, congenital dislocation of the hips.

From the hypotonia associated with rickets these cases are easily distinguished by the absence of any characteristic rickety bone lesion. The diagnosis from Oppenheim's myatonia congenita, which the authors consider as the simple atrophic form of the myopathies, remains entirely based on the condition of the tendon reflexes and the electrical reactions, which in the cases above described are normal. The most interesting feature of this group of cases is the loss of tone and synergetic power associated with well-preserved active movement. The pathology is practically unknown, and probably varies as much as the clinical picture of this and of the other forms of cerebral diplegia.

REFERENCE.—¹*Brit. Jour. Child. Dis.* 1915, 65.

CEREBROSPINAL FEVER.

E. W. Goodall, M.D.

The occurrence of a considerable number of cases of cerebrospinal fever in the British Islands, and also amongst the troops of the Allies on the Continent, during the end of 1914 and the early months of 1915, has revived acutely the interest in the disease which was roused by the outbreaks in Scotland and Ireland seven or eight years ago.

ETIOLOGY.—Cerebrospinal fever was first named and distinguished upwards of a century ago, in 1805; but it is hardly to be supposed that it was a brand new disease and that it had not existed long before that. Hamer¹ has pointed out that there were in the sixteenth, seventeenth, and eighteenth centuries accounts of epidemics in which nervous symptoms ('encephalitis,' and 'febrile cerebritis') were prominent signs, and he refers to a description by Sydenham in 1685 of a 'new fever,' the symptoms of which were those of an acute cerebrospinal inflammation. Hirsch, in his *Geographical Pathology*, divides the epidemiological history of the disease into four periods, of which the last ended in the early eighties. Osler², continuing the epidemic history, relates that a fifth period began in the early nineties in the eastern United States and Canada. Since that time the disease

has been heard of in various parts of the world, especially Silesia, France, the south-western United States, the United Kingdom, India, and, it may be added on the authority of Butler,³ East and Central Africa. But the disease has never been pandemic, that is to say, prevalent everywhere at the same time.

So far as the lessons of the present outbreak teach us, cerebrospinal fever is a disease of low morbidity but high fatality. Since 1912 it has been notifiable in England and Wales, and Newsholme⁴ emphasizes the fact that during the first few weeks of 1915 (when the public mind was becoming alarmed concerning it), its notifications fell far short in number of those of diphtheria, typhoid fever, and the other acute infections, so that the alarm was hardly justifiable. A curious fact is that while it is an epidemic and a bacterial disease, its power of spreading is feeble. Newsholme and others have pointed out that seldom does more than one case occur in an invaded house, even though the household is numerous; but there are occasionally striking exceptions to this rule (Chalmers,⁵ of Glasgow, and Robb,⁶ of Belfast), and it has at times been noticed that cases are prone to occur at long intervals in the same house.

A very important fact, elicited by bacteriological research, is that the micro-organism of the disease, the meningococcus, is to be found in a certain number of healthy persons, who act as 'carriers.' These carriers may be found not only in the presence of an epidemic, but also when the disease is not at all prevalent. Mayer and Waldmann⁷ found that in 1910 at Munich there were 1.7 per cent of carriers amongst the 9111 men of the garrison at a non-epidemic period; but according to Ledingham⁸ it must not be concluded from these figures that nearly 2 per cent of normal people are carriers, even in Munich in non-epidemic times, and still less anywhere else. He points out that Munich was not absolutely free from cerebrospinal fever during the period in question; cases had been occurring yearly; and it was therefore not at all improbable that some of Mayer's carriers, revealed at the meningitis free period, had been chronic carriers for some months, while others had been infected by such carriers. One carrier infects and becomes surrounded by a zone of carriers, as has been pointed out by Selter; and it is this chronic carrier, with his zone, who acts as the bridge between one epidemic and the next. It is known that the meningococcus is very short-lived outside the human body, and that, as a rule, carriers are carriers for a short time only. The organism has not been found in dust or air, or, indeed, any fomites, and there is no evidence that animals harbour it. Apparently, therefore, it must be kept alive in human beings, and is passed on rapidly from one person to another. Arkwright⁹ draws attention to the fact that during an epidemic the cases of the disease are widespread, and states that from this it may be deduced that carriers also are widespread. Actual observation during the recent epidemic supports this deduction. This writer puts forward the view that the conception of an epidemic of cerebrospinal fever ought to take account of the

carriers equally as of the actual cases ; and according to him, all the evidence about carriers leads to this conclusion, that it is more correct to say that cases of meningitis occur when and where carriers of the meningococcus become numerous than that many carriers occur in the neighbourhood of cases of meningitis. It is a curious fact that very seldom do carriers themselves develop the disease ; nor is it often spread directly from a patient to a healthy person. Consequently, a patient must become attacked very soon—almost immediately,—after he becomes infected with the organism, and patients may safely be treated in the wards of general hospitals. Experience has shown, also, that doctors and nurses in attendance upon the sick very rarely contract the disease.

Cerebrospinal fever is prevalent during the end of the winter and in the spring. Some believe that this is because during that season ordinary catarrh of the nasal passages is very prevalent on account of the weather conditions. Others also associate the prevalence with overcrowding and want of ventilation ; but the disease will certainly arise without these conditions, as has been pointed out by Wilkinson¹⁰ and Foster.¹¹ The former observer found that in India, where the disease occurred mostly in gaols, it prevailed in those which were among the best ventilated, while the latter witnessed an outbreak in the open-air wards of a hospital near Cambridge.

It has not been shown how the disease was introduced recently into these islands. The first supposition was that it was by means of the Canadian troops, and that the mobilization on account of the war was a factor in the dissemination, especially as cerebrospinal fever is, as Osler says, particularly a soldiers' disease (though, perhaps this is more true of France than of any other country). But the facts do not support this view.

BACTERIOLOGY.—It is now known that the meningococcus is an organism of low infectivity and vitality. It is with difficulty kept alive outside the human body. It is very like the gonococcus in many ways. In order to get the best results in respect of purity of culture, when cultures are to be taken from the pharynx and posterior nares, West's swabs should be used. "These swabs are bent wires, thinned at the distal end and slightly roughened to make them hold the wool firmly. They are enclosed in bent glass tubes, and look like Bellocq's sounds in glass instead of metal. . . . In practice the West's swab obviates the necessity of using a tongue depressor, and it serves that function itself if it is simply introduced sideways till it reaches the uvula, when it is suddenly slipped behind the palate by a deft movement, and the swab is extruded against the posterior wall of the pharynx. The tube is then turned sideways and withdrawn."¹² A culture medium for the meningococcus which is recommended by Lundie, Thomas, and Fleming, consists of egg (yolk and white) 66 per cent ; distilled water 33 per cent ; to every 100 c.c. of the mixture, glucose 3 per cent is added, and the whole is inspissated at 70° C. for two hours or more, according to the freshness of the egg.¹³

The meningococcus is to be found in the urine of carriers.

The large majority of bacteriologists are of the opinion that the meningococcus is the essential cause of cerebrospinal fever. Hort, Lakins, and Benians,¹⁴ however, in a critical paper on the pros and cons of the subject, conclude that it would appear to be unwise to make dogmatic statements that the meningococcus, as we now know it, is the cause of epidemic cerebrospinal fever, though this does not imply that the future may not provide better evidence than at present exists. They make the suggestion (and support it with some experimental evidence) that the meningococcus, as we know it, is a phase in the life-history of the causal organism of cerebrospinal fever, and that this organism possesses infecting power only in its earlier and unknown stages, when it is very minute. Alternatively they suggest that the meningococcus is not the true cause of the disease, but a secondary invader, and that the true organism is a filter-passer.

In support of these views may be quoted a paper by Donaldson.¹⁵ He noticed that in the cultures made from the cerebrospinal fluid of five cases of the disease, other organisms besides the meningococcus were present. From his observations he is led to believe that the causal organism is a pleomorphic diphtheroid rod closely akin to the Klebs-Löffler bacillus, if not a variant of that organism. With Hort he suggests that this and the meningococcus are really the same organism, seen at different stages of its life-history; and he further suggests that the failure of the specific antiserum noticed by several clinicians during the recent prevalence may be accounted for by this hypothesis. He gives the history of two cases in which the organisms he described were found; the first of them was a case which clinically was one of pyæmia, without meningitis; the second, presenting the symptoms of cerebrospinal meningitis, in which, post mortem, a left temporosphenoidal abscess with localized meningitis and septicæmia, following on chronic otitis media, was found. During life a Gram-negative coccus, beside the other organisms, was found in the cerebrospinal fluid.

Whether the meningococcus reaches the cerebral meninges directly, by way of the sphenoidal and ethmoidal sinuses, from the nasopharynx, or indirectly through the blood-stream, has not yet been decided.

According to observations made in two cases published by Ramond and Résibois,¹⁶ symptoms closely resembling those produced by the meningococcus may be set up by the *Micrococcus tetragenus aureus* (*tétragène dorée*). In both cases, too, there were symptoms pointing to enteritis, an affection which may also be caused by the same organism (*see* TYPHOID FEVER). In both instances the organism was found in the cerebrospinal fluid, and in both a cure seems to have been effected by the intraspinal injection of 1 c.c. of Colloidal Gold.

SYMPTOMS AND DIAGNOSIS.—Lundie, Thomas, and Fleming¹⁷ describe an attack of cerebrospinal fever as passing through three stages: the catarrhal, the septicæmic, and the meningæal. The first stage is very prevalent; it causes no symptoms that occasion any alarm,

and is looked upon as a pharyngitis, or that and a laryngitis combined. The septicæmic stage sets in when invasion of the bloodstream has taken place, and is apt to be mistaken for influenza. In respect of the meningeal stage, they emphasize the importance of making a careful study of the nervous symptoms. The patient is not alive to his critical condition. If his headache is very severe, he will, after replying to a question, lapse into an apathetic state. His senses are dulled early in the disease. The nervous symptoms are random in character; the lesion is not the same in every case, and it is not possible to systematize the symptoms, so as to draw a classical picture of a typical case from nervous symptoms alone. Horder¹⁸ states that, beside pain in the limbs there may be actual swelling of the joints as an early symptom. Sainton and Maille¹⁹ also draw attention to this fact, and state that arthritis due to the meningococcus may occur apart from meningitis. Another early symptom which is not infrequently present is that the patient chooses to lie on his side, and is uncomfortable if placed on his back. The legs are often kept bent at the knees. Headache and delirium are present simultaneously, in contrast with what occurs in typhoid fever, in which headache and delirium alternate. In respect of Kernig's sign, it should be remembered that it is present as a physiological condition up to the age of about two years. Babinski's sign is often present; this, too, is normal in infants. In cerebrospinal fever there is leucocytosis of the polymorphonuclear leucocytes, rather than of the lymphocytes as in tuberculosis.

As regards the diagnosis of cerebrospinal from other forms of meningitis, in the former spinal symptoms are usually more marked. In other words, if a case presents spinal symptoms it is one of cerebrospinal fever rather than meningitis due to the tubercle bacillus, the pneumococcus, and other organisms.

Embleton and Peters²⁰ record several cases in which there was reason to believe that an empyema of the sphenoidal sinus had a causal relation to an attack of cerebrospinal meningitis. In such cases the organisms reach the meninges by way of the lymphatics. Fatal cases of sphenoidal sinus empyema (not due to the meningococcus) usually develop cavernous sinus thrombosis; on the other hand, when the meningococcus infects the sinus, thrombosis does not occur and the meninges become attacked.

TREATMENT.—The consensus of opinion is still in favour of the specific treatment: that is, the injection of **Antimeningococcic Serum** into the spinal canal. At the same time, from more than one quarter, comes a note of disappointment at the results, so far as cases occurring during the recent prevalence are concerned. This failure to obtain the same favourable results as have been observed in previous epidemics is attributed by some to variations in the meningococcus itself. If this supposition be correct, then it would appear to be advisable to use serum obtained from horses which had been immunized by the prevailing strains of cocci, preferably a multivalent serum. Of such

sera as are available, Flexner's and Dopter's appear to be the most satisfactory. (*See also p. 30.*)

Until recently it has been considered advisable not to withdraw cerebrospinal fluid by suction in the operation of lumbar puncture, nor to inject antiserum into the spinal canal even with the slightest force; the serum has been allowed to run in by the action of gravity. American physicians have especially insisted upon these precautions, and have pointed out what they considered to be the too frequent occurrence of mishaps when antiserum was injected by means of a syringe into the canal. The experiences of British physicians, however, during the recent outbreak of the disease, go to modify these views. According to them, not only may fluid be withdrawn from the canal, but serum may be injected into it with a syringe, if due care be observed, without untoward results. The latter method is very much less tedious than the gravitation method, and time is a consideration when there are many patients and few physicians. That there is, however, a danger in the injection method is shown by a case recorded by B. S. Robson and A. L. Pearce Gould,²¹ in which symptoms of cerebral pressure developed during an injection, and the patient suddenly stopped breathing. In this case the fluid was at once allowed to run out and atropine was given subcutaneously, and the normal respiratory rhythm returned.

Shircore and Ross,²² Low,²³ Norman Butler,³ Gilks,²⁴ Barford and Rey,²⁵ and others recommend **Soamin**. It is injected intramuscularly in 5-gr. doses on each of the first two days after commencement, and 3 gr. on the fourth day, with occasional doses later. Butler used it in 5-gr. doses on alternate days, and states that he gave upwards of 300 injections without the occurrence of any untoward symptoms in a single instance. On the other hand, Batten²⁶ protests against its use in cerebrospinal fever, because, as he states, the drug was tried rather extensively in the treatment of syphilis in 1908-9 in various London hospitals, and he has seen not a few cases of optic atrophy follow its employment.

Aubertin and Chabanier²⁷ recommend the lavage of the spinal canal, after withdrawal of 50 to 60 c.c. of cerebrospinal fluid, with 50 c.c. of **Physiological Serum** (saline solution, 7.5 per 1000), before the injection of the antiserum. The liquid is injected and allowed to remain in the canal for five or six minutes before being let to run out again. This proceeding should be repeated once or twice in purulent cases. According to these writers, lavage is harmless and painless. **Autogenous Vaccines** are recommended by Collins,²⁸ Lundie, and others.²⁹

Sainton and Maille¹⁹ recommend, for the treatment of those cases of *arthritis* in cerebrospinal fever which do not show signs of resolution under local applications or if left to themselves, the evacuation from the joint of as much fluid as possible by means of a syringe and needle, and the injection of 5 to 10 c.c. of **Antiserum**. At the same time the joint should be immobilized and subjected to moderate

compression. Temporary swelling and pain may follow such an injection. In some cases the injection must be repeated several times.

PROPHYLAXIS.—The discussion on this point turns largely on the question of the treatment of 'carriers.' Some bacteriologists incline to advocate the isolation of these persons (Arkwright)⁹; but administrative officers, such as medical officers of health, do not place much reliance on this measure. Thus Chalmers⁵ states that though cases and contacts were isolated in Glasgow, and the nasopharynx of carriers was douched, it was extremely doubtful whether any influence was thereby exerted on the course of the epidemic. It appears to be difficult to get rid of the coccus from the throats of carriers. Chalmers found a simple **Alkaline Douche** most efficacious. In the French Army the following inhalation, recommended by Vincent,³⁰ is used: **Iodine** 12 grams, **Guaiaicol** 2 grams, **Thymol** 35 cgrams, **Alcohol** 200 grams, **Potassium Iodide** 6 grams; to be used five or six times a day. Sophian used with success in the Texas epidemic **Hydrogen Peroxide** 1 per cent, with **Argyrol** 9 per cent, as a spray (quoted by Osler).

The measures advised by the Local Government Board²⁹ are as follows:—

"Precautionary Measures as to Contacts.—All persons who have been in attendance on, or otherwise in close personal association with, the patient should be regarded as possible carriers of infection. The duration of the infectivity of contacts is doubtful. It will be a useful rule to regard them as possibly infective for three weeks from the date of last association with a patient, but the partial restrictions to their intercourse, otherwise desirable, may be relaxed if swabs from the nasopharynx fail, preferably on two occasions, to show the presence of the meningococcus. Contacts should be instructed and warned that they may be a source of danger, although remaining quite well themselves, and that for this reason they must abstain from intimate personal association with others. This rule should be especially followed by contacts who have catarrh. Contacts should also be advised that an open-air life diminishes the risk of infection both of themselves and of others. Isolation of such contacts in a hospital should not be attempted. Detection of the meningococcus in the nasopharynx of a contact is valuable evidence of his potential infectivity to others, while failure to find the micro-organism does not possess an equal negative value. Nasal sprays have been recommended for contacts, a disinfecting solution such as potassium permanganate, 1-1000, being used. If spraying is employed, it should be carried out under medical supervision.

General Preventive Measures.—In the presence of cerebrospinal fever the nearest approach to open-air life should be aimed at, especially for all contacts. In view of the known association of cerebrospinal fever with overcrowding, insufficient ventilation, and uncleanness, the avoidance of these conditions becomes a matter of prime import-

ance. This is especially true where large numbers of persons are aggregated under one roof."

This is quoted as being the official advice of the Government department which is responsible for the health of the country, but it is doubtful whether what is stated in the last paragraph is in accordance with the most recent knowledge.

Prophylactic Vaccination has not yet come within the region of common practice, but we allude to it as a matter of interest, which might in special circumstances become useful and important. In previous volumes of the MEDICAL ANNUAL attention has been drawn to the prophylactic inoculations practised in a few cases by Sophian, Abraham, and Black. The last-named³² has made a further series of complement-fixation observations on seven of the original ten persons who had been vaccinated two years previously. He came to the following conclusions amongst others: Prophylactic vaccination produces a high degree of immunity in most cases, this immunity being demonstrable at the end of two years. It seems a justifiable conclusion that most persons prophylactically vaccinated may safely consider themselves immune for at least two years. Exceptions to this will, of course, be found. Some individuals may show an actual increase in immune bodies at the end of one year over those demonstrable soon after vaccination. Experimental evidence warrants us in concluding that prophylactic vaccination is a measure of the greatest value in the control of epidemic meningitis.

REFERENCES.—¹*Proc. Roy. Soc. Med. Sect. of Epid.* 1915, 65; ²*Ibid.* 41; ³*Lancet*, 1915, i, 692; ⁴*Proc. Roy. Soc. Med. Sect. of Epid.* 1915, 48; ⁵*Ibid.* 50; ⁶*Ibid.* 55; ⁷*Ibid.* 41; ⁸*Ibid.* 66; ⁹*Ibid.* 69; ¹⁰*Ibid.* 81; ¹¹*Brit. Med. Jour.* 1915, i, 543; ¹²*Ibid.* 493; ¹³*Ibid.* 494; ¹⁴*Ibid.* 541 and 715; ¹⁵*Lancet*, 1915, i, 1333; ¹⁶*Progrès Méd.* 1915, 463; ¹⁷*Brit. Med. Jour.* 1915, i, 836; ¹⁸*Pract.* 1915, i, 636; ¹⁹*Presse Méd.* 1915, 345; ²⁰*Lancet*, 1915, i, 1078; ²¹*Jour. Roy. Naval Med. Service*, 1915, 255; ²²*Trans. Soc. Trop. Med. and Hyg.* 1913, Dec. 83; ²³*Brit. Med. Jour.* 1915, i, 376; ²⁴*East Afr. Protect. Ann. Med. Rep.* 1913, 90; ²⁵*Brit. Med. Jour.* 1915, ii, 400; ²⁶*Lancet*, 1915, i, 964; ²⁷*Presse Méd.* 1915, 213; ²⁸*Brit. Med. Jour.* 1915, i, 287; ²⁹*Ibid.* 836; ³⁰*Ibid.* 189; ³¹*Lancet*, 1915, i, 452; ³²*Jour. Amer. Med. Assoc.* 1914, ii, 2126.

CEREBROSPINAL FLUID.

O. C. Gruner, M.D.

A considerable literature on the analysis of this fluid has appeared during the year. The publications of Callander¹ and Kafka² are the more important. A complete scheme of diagnosis comprises the following methods of investigation:—

1. *Cell-count*.—The maximum normal number of cells is 8 per c.mm. The cell-count is low in epilepsy, rather high in tabes. It is increased in 33 to 67 per cent of cases of syphilis of the nervous system.³ Plasma cells are noted in cases of general paralysis. A staining method for counting purposes is given by Lemchen.⁴ Two solutions are needed: (a) a 2 per cent solution of benzidin in glacial acetic acid, (b) hydrogen peroxide. The two are mixed in equal quantities before use, the mixture drawn up to the 0.5 mark in a white-cell pipette, while the cerebrospinal fluid is drawn up to the

11 mark. The red cells come out blue, the neutrophils yellowish with blue granules in the nucleus, while lymphocytes show a blue ring. Plasma cells are almost black.

2. *The Globulin Test.*—There are three ways of carrying out this test. (a) 2 c.c. of fluid are treated with 2 c.c. saturated ammonium sulphate. In three minutes a comparison is made with another tube of fluid alone. An opalescence or turbidity signifies a positive Nonne-Apelt reaction. (b) 0.1 c.c. fluid and 0.5 c.c. of 10 per cent butyric acid in saline is boiled briefly; 0.1 c.c. of normal soda is added, and the mixture again boiled for a few seconds. A granular precipitate means a positive Noguchi reaction. (c) 0.5 c.c. fluid is boiled twice; 3 drops of 5 per cent butyric acid in saline are added, and 0.5 c.c. supersaturated ammonium sulphate is instantly added, allowing it to under-run the fluid. A thick granular ring should appear in 20 minutes if the reaction is positive. In this case four other tubes are taken, containing respectively 0.1, 0.2, 0.3, 0.4 c.c. fluid. Each tube is made up to 0.5 c.c. with distilled water. The first procedure is repeated. If a ring appears in the 0.1 tube, the result would be called a 0.1° reaction, which is high. This is Kaplan's method.

The ammonium-sulphate reaction may be applied in another way, different strengths being used. Precipitation beginning with less than one part of reagent and two of fluid, points to acute meningitis (ppt. of fibrinogen and fibrinoglobulin); beginning with fully one part reagent and two of fluid, points to general paralysis (euglobulin); beginning only with equal parts of each, points to chronic syphilis (pseudoglobulin). (See Fig. 19.)

3. *Total Proteid.*—The ratio of total proteid to globulins is determined. In general paralysis the ratio is as $1\frac{1}{2} : 1$, in lues as $12 : 1$, in acute meningitis as $6 : 1$. The normal percentage of albumin is 0.02. This is increased to 0.5 or 0.6 in cerebrospinal fever.

4. *Wassermann reaction* in the serum is parallel with that in the cerebrospinal fluid.

5. *Hæmolysin Reaction.*—This consists in submitting 5 c.c. of the fluid to 0.5 c.c. of 5 per cent emulsion of sheep's red cells and 0.05 c.c. guinea-pig complement. The degree of hæmolysis is registered according to an arbitrary scale (6-1). Let the value on this scale

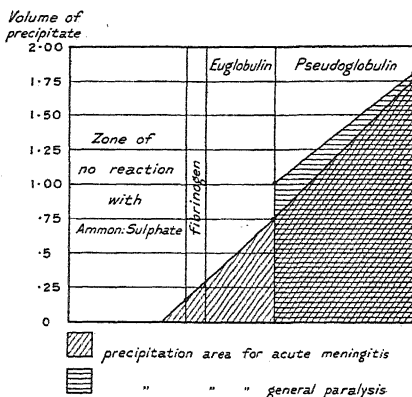


Fig. 19—Globulin test for cerebrospinal fluid. The shaded areas show the precipitation-zones against ammonium sulphate in the case of two diseases (acute meningitis, general paralysis). The height above the abscissa shows the volume of the precipitate of globulin in the centrifuge tube.

be x , then $\frac{10}{x}$ = the quotient of 'permeability.' Ten is the multiple of the fluid used over the serum.

6. *The Gold Reaction*.—There is little to add to the review in the MEDICAL ANNUAL of 1915. A paper by Swalm and Mann,⁵ who investigated psychiatric cases, speaks highly of the value of this reaction in general paresis, 90 per cent presenting the typical curve. Tabes gives a marked luetic curve in 50 per cent. Non-luetic psychoses produce weak reactions without characteristic curves. These authors do not trust to the reaction in the absence of the other

CLINICAL PATHOLOGY OF THE CEREBROSPINAL FLUID.

	Cell-count	Globulin	Total Proteid	Wassermann in	
				Serum	Fluid
Acute suppurative meningitis	High	+	6 : 1	—	—
Cerebrospinal fever ⁸ ..	Polynuclears high	+	..	—	—
Cerebral hæmorrhage ..	+	Low	..	—	—
Epilepsy	0	0	..	—	—
Syphilis—					
Early	More than 60	α	..	+	—
Well-marked	60 or less	+	12 : 1	+	+
Late	40 or less	Normal	..	—	+
General paralysis—					
Early	7 % mast cells	.4°	..	+	—
Well-marked	100	.3°	1 : 5 : 1	+	+
Late	26	.5°	..	—	Partial
Tabes	15-100	.α	..	+	+
Localized syphilis of the nervous system (nothing but Argyll - Robertson pupil)	Normal	0	..	—	—

methods of investigation of the cerebrospinal fluid. Debenédetti and Olivero⁶ also testify to the value of the test in general paralysis. In syphilis without nerve symptoms, the reaction is weaker than in tabes.

7. *The Reduction Index*.—Lachner and Levison⁷ employ this method in cases of tuberculous meningitis. It may be successful where all other tests prove negative. 1 c.c. cerebrospinal fluid is diluted with 50 c.c. water and treated with 10 c.c. of 1-4 sulphuric acid. The mixture is boiled, 10 c.c. decinormal potassium permanganate are added, and the mixture again boiled (ten minutes). Now

add 10 c.c. decinormal oxalic acid, and titrate with potassium permanganate until the red returns. The number of c.c. needed gives the permanganate or reduction index. A control is made with water alone. The reading is 2 or more in meningitis. The greater the number of cell elements, the higher the index.

The effect of treatment for syphilis upon the cerebrospinal fluid is to cause the cell-increase to pass away first, the globulin reaction disappears next, and the Wassermann last. If the latter does not change, the case is called 'Wassermann-fast,' and the prognosis is bad because betokening a future onset of tabes.

If one has a case of syphilis, and the cerebrospinal fluid gives a Wassermann as well as the blood-serum, it is most probable that nervous lesions will develop (Callander).

Nabarro⁸ finds that the meningococcus will grow best on a serum placenta agar, but in many cases the organisms grow best in the cerebrospinal fluid itself. An ultramicroscopic infective agent appears to be conveyed by the urine. The other characters of the cerebrospinal fluid in this form of meningitis are well known. It may be said that the disease cannot be diagnosed unless the fluid is definitely purulent to the naked eye. (See Table on previous page.)

REFERENCES.—¹*Med. Jour. Austral.* 1915, Aug. 171; ²*Münch. med. Woch.* 1915, 105; ³*Med. Rec.* 1915, ii, 231; ⁴*Ibid.* 443; ⁵*N.Y. Med. Jour.* 1915, i, 719; ⁶*Riforma Med.* 1914, 906; ⁷*Arch. Ped.* 1915, 508; ⁸*Brit. Jour. Child. Dis.* 1915, 193.

CHOLERA.

Sir Leonard Rogers, M.D., F.R.C.P.

ETIOLOGY AND PATHOLOGY.—E. D. W. Greig¹ has continued his work on the *bacteriology* of cholera, and made further observations on the invasion of the tissues by the cholera vibrio in fatal cases, which confirm the frequency of the organism in pneumonic lesions and in the biliary passages, as he had previously pointed out. He also shows that they may be found in other internal organs, including the liver, spleen, kidneys, heart muscle, etc., and to a marked extent in the mesenteric glands. As he has not been able to recover the organism from the blood-stream, he considers the lymphatic channels the most probable source of the systemic infection. Further work by the same writer² on the lesions of the gall-bladder and biliary passages shows that the whole tract from the gall-bladder to the common bile-duct and the neighbourhood of the biliary passages in the liver, are occasionally infected with cholera organisms in fatal cases. This is of great importance from the point of view of 'carriers.' In a further series of papers^{3,4} the same author reports having found true cholera organisms agglutinating with a cholera serum, and also cholera-like vibrios not so agglutinating, in both the stools and tissues of cholera patients. He has made a special study of the cholera-like forms with a view to differentiating them from true cholera vibrios. The hæmolytic action differs in that the true cholera organism does not form hæmotoxin which dissolves red corpuscles when grown on

a blood-agar plate, producing a clear area around the growth, while the cholera-like vibrios usually do produce this effect.

Greig⁵ has also made an extensive study of *agglutinins* in cholera, and finds that in favourable cases they may appear in the blood as early as the second day, while they increase markedly with the recovery of the patient. On the other hand, in fatal cases little or no agglutinins are produced even when the patients survive for a number of days. In patients who are still harbouring the cholera vibrios in the bowel on discharge from hospital, the serum usually clumps the vibrio in fairly high dilution, so that this test is likely to be of great importance in detecting cholera-carriers. Lastly, this worker⁶ records having found a carrier who infected the Calcutta water-supply tank, but was fortunately detected before any outbreak of cholera had resulted.

O. Schobl⁷ has tested the viability of the cholera organism in Manila waters, and found it might survive at room temperature for fifty-six days, and in sea water up to ninety-six days. B. C. Cromwell⁸ records the post-mortem changes in cholera, and discusses their diagnostic value.

A. W. Sellards⁹ records further important observations on *acidosis* in cholera and its relationship to the very fatal post-choleraic uræmia, which accounted for about 15 per cent of the deaths from cholera in the Philippine Islands. He noticed that as the evidence of nephritis became prominent, an increased tolerance to sodium bicarbonate developed, as shown by the fact that large quantities of this drug failed to render the urine alkaline, although no conclusive evidence was available of reduction of the titratable alkalinity of the blood. In two typical cases the carbon-dioxide content of the blood was found to be much reduced. The early administration of sodium bicarbonate practically eliminated death from uræmia in two cholera epidemics. In 78 cases treated with neutral salt solutions, 12 died of uræmia, and the total mortality was 62·8 per cent, while among 77 cases treated with alkaline solutions, only 1 died of uræmia, the total mortality being 41·5 per cent. [This last figure is still double the recent mortality in Calcutta cases treated with hypertonic saline and alkalies.—L. R.]

L. Rogers and A. J. Shorten¹⁰ have made careful estimations of the alkalinity of the blood by Sir Almroth Wright's method in a series of cases of cholera. Only in two very mild cases was the alkalinity within the normal limits of $\frac{N}{30}$ to $\frac{N}{45}$. In all cases showing collapse the alkalinity was reduced much, in proportion to the severity of the disease, varying in recovering cases from $\frac{N}{30}$ to $\frac{N}{80}$. When approaching the latter figure urinary secretion was usually deficient. In very severe cases dying of collapse the alkalinity may be still lower, in one case having reached $\frac{N}{160}$. In patients dying of uræmia it was always extremely low, from $\frac{N}{30}$ to $\frac{N}{120}$, and in one case $\frac{N}{240}$. Thus marked reduction of the alkalinity of the blood is a constant feature in severe cholera, but reaches a most extreme degree in uræmia, as Sellard

suspected. In a further paper,¹¹ Rogers records a reduction of the death-rate from uræmia from an average of 11 per cent in three years to only 3·4 per cent in the first half of 1915 among 145 cases by the administration of one pint of sodium chloride 60 gr. and sodium bicarbonate 160 gr. (2 per cent) whenever a second intravenous injection was required, and with the first one in late admissions with threatening uræmia.

Victor G. Heiser¹² deals with an outbreak of cholera in the Philippine Islands in 1913 after an absence of two years. The first eight cases occurred in widely different sections of the city, and no connection could be traced between them, although later there were a number of contact cases. He found that 80 per cent of the cases occurred in houses unsupplied with water-closets. Of 72 groups of contacts whose stools were examined bacteriologically 29 showed true cholera-carriers. The necessity for laboratory facilities in dealing with cholera is thus made clear. In every town in which prompt measures were taken to isolate and examine bacteriologically all contacts with the first cases, the disease was eradicated within a few days. In one province whose people were obstructive the disease spread. There is strong reason to believe that the disease was not imported, and that it probably arose through cholera-carriers, possibly being assisted by some variation in the virulence of the organisms. Prompt disinfection of the evacuations of all cases is the most important measure to adopt. During prevalence of the disease, races who eat with their fingers should be encouraged to disinfect first with a 1-1000 bichloride of mercury solution or other disinfectant. Flies appeared to have played some part in carrying infection.

E. L. Munson¹³ reports on an elaborate search for carriers during an outbreak of cholera in Manila, during which bacteriological examinations were made of the stools of over 100,000 healthy people within a few months, and over 500 carriers were detected and isolated. During the progress of the outbreak, 1·75 per cent of healthy persons examined were found to be carriers. Floods threatened to cause a great extension of the outbreak, and it is believed that the isolation of so many carriers prevented the extension of the disease. In several cases carriers subsequently developed cholera, one dying. The excretion of the comma bacilli may be intermittent. Otto Schobl¹⁴ gives details of the cholera-carriers in the same outbreak in 80 cases, in 65 of which the infection did not last over fourteen days; but in one it continued for forty-eight days. He agrees with Greig that the gall-bladder is the chief site of infection. The same worker, in another paper,¹⁵ discusses the media for isolating comma bacilli, and concludes that Dieudonné's plates and Kraus's medium, in addition to peptone water, are the best.

TREATMENT.—L. Rogers¹¹ records the results of 1000 cases of cholera treated by his method of **Hypertonic Salines** intravenously and **Permanganates** by the mouth since 1909 in his wards at the Calcutta Medical College Hospital, with a mortality of only 25 per cent,

against 59 per cent in the eleven years before he started work, while during the first half of 1915 the mortality in 145 cases was only 20 per cent, the deaths from uræmia having been much reduced by the addition of **Alkalies** as above mentioned. The mortality is highest among children up to five and in adults over fifty years of age. Between those ages the mortality last year was only 16 per cent. He has recently tried **Atropine**, as first advised by Sir Lauder Brunton, using it in alternate cases in doses of 100 gr. morning and evening during the acute stage, with very promising results so far, as the mortality among 75 atropine cases was only 10·7 per cent, against 24 per cent in 75 controls, while the deaths from collapse were only one-third as many among the atropine-treated cases.

W. W. Cadbury and J. A. Hofmann¹⁶ report on the treatment of cholera by saline transfusion in China, closely following Rogers's methods. The outbreak took place in a lunatic asylum, and the conditions of work were very difficult. Subcutaneous saline injections were first used for want of apparatus for intravenous injections, but very little good effect was obtained. On the other hand, 74 per cent of the cases treated by intravenous injections recovered, although only the severe cases received them. Uræmia was the most fatal complication, dilute sulphuric acid having been given by the mouth, although Rogers has pointed out that acids predispose to uræmia.

A. P. Goff and O. E. Denny¹⁷ record clinical observations on 230 cases of cholera in Manila. Of these, 61 per cent were seriously ill on or soon after admission, yet 72·5 per cent of the total cases recovered. A saline solution composed of 0·45 per cent sodium chloride and 0·25 per cent sodium bicarbonate was injected slowly, by means of a needle 0·5 mm. bore introduced into the vein through the skin without incision at the rate of about one litre in forty-five minutes, an average of 2·5 litres being given. In many cases continuous proctolysis was used with great advantage, and by increasing the urinary excretion appeared to reduce materially the dangers of uræmia.

J. A. Sinton¹⁸ records 69 cases of cholera treated by Rogers's methods in villages on the North-West frontier of India under great difficulties during a severe epidemic, with a mortality of 76 per cent. He obtained a recovery-rate of 79 per cent, leaving a mortality of but 20·8; 7 of the deaths were due to uræmia, and only 2 to collapse, while 2 died of asthenia. C. Maddock¹⁹ records an interesting trial of Rogers's **Permanganate Pills** distributed among villages in the Ahmednagar District, Bombay Presidency, infected with cholera, under conditions precluding the full treatment with hypertonic salines. Among 423 cases, a death-rate of only 22 per cent was recorded, against one of 60 per cent among those who refused the treatment. These cases were personally observed by assistant surgeons. According to returns supplied by non-medical officials, out of 4,574 patients said to have been treated with the pills, the mortality was 35·5 per cent, against 51·6 in untreated cases. All the chief men and

officials reported favourably on the treatment. In the following year, 1913, the death-rate among those taking the pills was 22·8 per cent, against one of 72·2 in those untreated. These results are very encouraging, and have led the Bombay Government to issue through the Medical Stores Department 'cholera treatments,' containing twenty-four 2-gr. permanganate pills in little bottles, which will be widely distributed during future outbreaks, just as quinine is for malaria.

R. Bryson²⁰ records the success of Rogers's treatment in the First District of Madras, and obtained a reduction of the mortality from 75 to 15 per cent. He graphically describes the difficulties of organizing and carrying out the treatment during a severe epidemic without previous adequate equipment of a special hospital for the disease, and pleads for forethought on the part of the Government to enable the 80 or 90 lives out of every hundred to be saved, as can now be done.

G. Duncan Whyte²¹ records his experiences of the same treatment during an epidemic at Swatow, in South China. He considers that there was no real advance in the treatment of cholera from the time Latta (1832) gave normal salines intravenously, until Rogers introduced the hypertonic solution. Whyte agrees with Rogers that with a blood specific gravity below 1062, salines are not required, and follows the same author in all essential details. The mortality steadily increased with each decade from 11 to over 60. Opium smokers did badly, often succumbing to hyperpyrexia or uræmia. The total recoveries were 72 per cent. With a blood-pressure below 70, intravenous injections are necessary; but if it lies between 70 and 100 in a Chinese subject, subcutaneous and rectal salines usually suffice. The diastolic pressure should also be watched. The establishment of specific gravity and blood-pressure indications for intravenous injections has done away with former difficulties and anxieties in that respect. The injections usually stop troublesome vomiting. Small frequent stools on the third or fourth day may be combated by small **Starch Enemata**, containing one or two drachms of **Bismuth Subnitrate** and half a drachm of **Tincture of Opium**. To maintain the strength in feeble subjects, dextrose may be dissolved in the saline fluid. The patients must remain in the recumbent position. In only 6 per cent was collapse the cause of death. He approves of Rogers's precautions for preventing and dealing with hyperpyrexia. Uræmia was the cause of death in only 3 per cent, most of whom were patients over fifty years of age. He found that the best drug for raising the blood-pressure in these cases was the liquid extract of **Apocynum Cannabinum** in 2-min. doses every three or four hours. In this stage, if saline has to be given intravenously, it should be one drachm to the pint, and by the rectum water only, as excess of salt must be avoided. Cupping over the kidney is valuable.

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¹⁰*Ind. Jour. Med. Research*, 1915, Apr. 867; ¹¹*Lancet*, 1915, ii, 219; ¹²*Med. Rec.* 1914, ii, 827; ¹³*Philadel. Jour. Sci. Sect. B.* 1915, 1; ¹⁴*Ibid.* 11; ¹⁵*Ibid.* 127; ¹⁶*Jour. Amer. Med. Assoc.* 1914, i, 1200; ¹⁷*Ibid.* 1915, i, 1148; ¹⁸*Ind. Med. Gaz.* 1915, 281; ¹⁹*Ibid.* 255; ²⁰*Ibid.* 274; ²¹*Brit. Med. Jour.* 1915, ii, 425.

CHOREA.

Frederick Langmead, M.D., F.R.C.P.

Simon S. Leopold¹ has studied the blood in 20 cases of chorea, and noted a distinct eosinophilia varying from 4 to 16 per cent in 10 of them. In 9 instances in which the chorea was recurrent, the number of attacks varying from one to five, eosinophilia was found in 6, and in every case in which there were three or more recurrences. In the other 11 cases the blood was examined during or after the first attack. In 1 of these the diagnosis was very doubtful, and in 2 others the chorea had subsided; no eosinophilia was present in the 3. In the remaining 8 cases, eosinophilia, varying from 4 to 6 per cent, was present in 4. In none was the eosinophilia higher than 6 per cent, whereas in the recurring cases 13, 15, and 16 per cent was found. Other observers have recorded the presence of eosinophilia in chorea. T. R. Brown refers to 12 examinations of the blood of two cases. He found eosinophilia ranging from 5.2 to 9.5 per cent. R. C. Cabot states that chorea showed in 12 cases normal blood except for an increased number of eosinophiles. C. J. Macalister accidentally observed that two cases of chorea showed respectively 20 and 16 per cent of eosinophiles. He subsequently examined the blood in six or eight cases, and found eosinophilia in all but one. None of the cases of rheumatism studied by him showed this peculiarity. The indications drawn by Leopold from his observations are: (1) Eosinophilia is present in the majority of cases of true Sydenham's chorea. (2) It is present almost invariably in recurring cases, especially when there has been more than a single recurrence. (3) The absence of eosinophilia in every case where the diagnosis of true chorea was in doubt, may prove of some diagnostic significance in border-line and doubtful cases. (4) The presence of eosinophilia is in favour of the view that chorea is of infective origin.

REFERENCE.—¹N. Y. *Med. Jour.* 1914, ii, 225.

CLEFT PALATE AND HARELIP. *W. I. de C. Wheeler, F.R.C.S.I.*

Many questions surrounding the surgery of harelip and cleft palate still remain unsettled, and several problems lend themselves for discussion. Most authorities believe still that Langenbeck's operation performed at the age of from eighteen months to three years is the best. There is a comparatively small immediate mortality, and the after-results as regards speech and general well-being of the child appear to compare favourably with other methods. The flap operation associated with the name of Lane is advocated by those who operate in earliest infancy. It is claimed that if the deformity is thus early corrected, the speech results and the general anatomical development of the palate and nasopharynx will be more satisfactory

than if operation is delayed. Lane, in urging very early operation, quotes Sir Almroth Wright as saying that the resistance of the child at birth is the same as that of the mother, but that later it is diminished. The immediate mortality after such an operation on an infant only a few days old is likely to be high, but no figures are available on this point. It would, of course, be impossible to perform Langenbeck's operation on a very young infant, and Lane's flap method or Brophy's operation must be substituted if it can be proved that very early operations are followed by the best results.

Brophy's method of operating in early infancy by forcibly squeezing the upper maxillæ together and using wire to retain the position, has not gained many supporters of late years. The operation is a severe one, and even in Brophy's hands appears only to close the alveolar portion of the cleft. Furthermore, this limited closure will very often occur spontaneously after early operation on a harelip. On statistical evidence based on the immediate operative results and the after-results, with reference not only to the closure of the cleft but to the speech and general cosmetic effects, it must be concluded that the Langenbeck operation of raising mucoperiosteal flaps holds the surgical field. The methods of suture must vary in different hands. Free division of the aponeurosis of the soft palate at its junction with the bony palate will always mobilize the flaps sufficiently to enable the sutures to be introduced without difficulty. If good results are to be expected, there should be no tension on the flaps, and thus, if the operation is carried out correctly, tension sutures are superfluous.

Blakeway¹ condemns the flap operation, and says that because of the early age at which the operation can be done, in theory the speech should be much better than in cases where operation is deferred to a later date; but this has not yet been realized in practice. It is not proved that very early operation is necessary in order to secure good speech. He thinks that the principle of Brophy's operation is unsound, but it is not clear that on that account it ought to be abandoned altogether. The usual result of the operation appears to be closure only of the alveolar arch, with no great narrowing of the cleft behind, and it is well known that almost similar results may follow with much less risk if the harelip be closed and an interval of a few months be allowed to elapse. In certain bad cases ultimate functional results will sometimes be better if Brophy's operation has been carried out as a preliminary; but as a routine measure it ought not to be used.

From a general perusal of the literature, the weight of evidence goes to show that there is a much better prospect of success if Langenbeck's method is employed at a suitable age by a competent surgeon. There is no great advantage in performing the operation in the first year of life, and the prospect of success is probably better in the second or third year. [The writer has found that the method of controlling the facial muscles, as recommended long ago by Butcher

and others, with adhesive strapping, after operations for harelip, defeats its own end. It is presumed that the facial contortions and crying of the child tend to drag the approximated margins of the lip apart; but the very presence of adhesive strapping about the face irritates the child to such an extent that restlessness and crying are the inevitable result. Furthermore, the dressing does not remain clean, and it is difficult to re-apply strapping in an infant. It is therefore better to abandon all dressings after the operation for hare-lip in a child, and be content with a smear of bismuth and iodoform paste or collodium and iodoform over the line of sutures. He has found from experience that children without dressings on the face cry little and are easily nursed. Tension on the line of sutures and opening of the wound rarely, if ever, occur.—W. I. de C. W.]

Blakeway² returns to the subject of cleft palate, and repeats that in Brophy's operation only part of the cleft to be closed has been in the alveolar arch, and asks whether it is worth while or justifiable to submit the infant to an operation of the severity of Brophy's in order to bring about this result. In reference to the removal of the premaxillæ which formerly held a well-recognized place in the treatment of harelip and cleft palate, he doubts if this procedure is ever justifiable. He referred to the results of the flap operation in 87 cases traced at periods up to nine years after operation. In only one of the cases which he saw was there a good result as regards speech, and that child was fourteen months old at the time of operation, almost the age at which Langenbeck's operation was commonly performed. The vast majority of children who spoke badly in after years had been operated on at an earlier age than six months.

Brown³ endeavours to reduce the various controversial points in connection with cleft palate and harelip down to first principles, and to strip the literature of confusing differences. He thinks, if the mere covering of a palate fissure with tissue is to be the standard of success, all generally recognized methods must be entitled to appreciation. If, on the other hand, speech improvement be the determining factor, a wide range of distinction between different methods must be recognized. In judging the different results, cosmetic effect, general growth, and health should be included with speech improvement. The removal or partial destruction of the premaxillæ is forcibly and very properly deprecated in the operation for the cure of harelip. The hideous examples of deformed mouths and faces that these patients present in later life are only too eloquent in their silent condemnation of this procedure. Compression of the maxillary bones in infancy and the employment of wires for the purposes of retention after the method of Brophy are not advocated. Such operations destroy from one to four or more of the developing tooth germs; therefore these teeth do not erupt. In addition, there are intranasal deformity and arrested maxillary development. The face is not symmetrical, and the best speech function is impossible. The

flap-reversing operations associated with the name of Lane may simplify the actual difficulty in operative performance, but do not ensure an approximation to normal palatal conditions. As the result of a very large experience, Brown favours Langenbeck's operation or one of its modifications. After paring the fissure borders, the mucoperiosteal flaps are raised with periosteal elevators of different angles and shapes. A single aluminium-bronze wire is passed through small button plates of silver to about the centre of the flaps to relieve tension. He thinks that there is much to be said on both sides of the question as to whether the best speech is obtained by palate closure before the child begins to speak or afterwards.

In theory, the palate should be closed before the child begins to talk, but practically this is not always so. All operative procedures are completed if possible before the child is two years old, and possibly at eighteen months or even earlier. On the other hand, good results were obtained in patients whose ages at the time varied from nine to sixty years. Some of the most imperfect speech results followed operations performed at two years of age. Brown comes to the conclusion that perfection in the form of the palate after operation is of paramount importance, and a more active factor in determining good speech results than the age of the patient at the time of operation.

Goyder⁴ thinks if it is shown that in a fair percentage of cases early operation prevents the establishment of cleft-palate speech, and that in the remainder education corrects it, we must adopt early operation if the mortality is not excessive. He questions, however, the advisability of operation in early infancy, as it has not been proved that such procedures prevent the defects in articulation seen after such operations. The question can only be settled by a publication of the results of consecutive cases. We know exactly what results can be achieved at or about the age of three years, but there are no figures either to prove or disprove the efficacy of the operation on very early cases. He differs from Blair in thinking that Brophy's method of squeezing the bones together and using wire for retention purposes should give a higher percentage of good speech results than that obtained from other methods.

REFERENCES.—¹*Lancet*, 1915, i, 480; ²*Pract.* 1915, ii, 145; ³*Surg. Gyn. and Obst.* 1915, i, 87; ⁴*Ibid.* 95.

COCCIDIOIDAL GRANULOMA.

Herbert French, M.D., F.R.C.P.

More cases have been recorded in America than elsewhere; but as the diagnosis depends upon full bacteriological investigations of the material obtained from what otherwise may be taken for ordinary persistent boils, it seems probable that this condition is not really so rare as might be supposed. The patient develops slowly progressing swellings in the subcutaneous tissues, at first hard, almost like periosteal thickenings if situated over a bone, afterwards softening in the middle, becoming tender, and bursting through the skin. Wolbach¹

records cases of the kind in which, after other methods of treatment had failed, complete cure resulted from **Operation**, opening out and thoroughly curetting each of the nodules, or as the patients call them, 'boils,' in turn. The contents generally consisted of necrotic tissue with brownish or greyish pus, and on culture media the causal organism grows as a mould-like fungus.

REFERENCE.—¹*Bost. Med. and Surg. Jour.* 1915, i, 94.

CONJUNCTIVA, DISEASES OF. (*Vol.* 1915, *p.* 200.)

COPRA ITCH. (*See* DERMATITIS.)

COXA VARA.

W. I. de C. Wheeler, F.R.C.S.I.

Coxa vara can occur at all ages; in infancy the congenital (?) form, the rachitic form in childhood, in adolescence the obscure variety which is probably due to epiphyseal trauma, and the coxa vara of senility often following injury or rheumatoid changes about the head and neck of the femur.

Steindler¹ discusses in detail the traumatic variety of 'coxa vara adolescentium.' He emphasizes the frequency of unrecognized or partial separation of the upper femoral epiphysis the result of trauma, and points out that after the injury the young patient does not lose the function of the limb, but is able to bear weight on it. Steindler says that absolute reliance cannot be placed on x-ray evidence; inasmuch as very slight lesions will not show, any more than they do in injuries to the spine which are followed later by post-traumatic kyphosis.

Ridlon² draws attention to and eulogizes Elmslie's views on coxa vara, but in his own practice limits the term coxa vara to a giving way of the epiphyseal line between the head and the neck to a greater or less extent, sufficient to give rise later to the characteristic symptoms. He supports the statements of Steindler and others that the diagnostic symptoms may be present before x-ray photographs show a slipping at the epiphyseal line and before any shortening can be ascertained. He notes "the great frequency with which we find these boys having coxa vara to be fat, and if male of the feminine type, and with underdeveloped sexual organs. All children of this type should be constantly under medical supervision and such preventive diet and drug treatment as seems indicated." He has treated all cases of coxa vara for the past four years by strong **Traction** with the limb abducted, the patient not being anesthetized, and while the limb was held in this position a plaster splint was applied from the ankle to the nipples. He has allowed the patients to lie still or walk about as they might choose; and has continued this treatment until the patient had walked without pain or sensitiveness for at least three or four months.

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1915, i, 216; ²*Ibid.* 219.

CYSTS (TRAUMATIC) OF METACARPAL BONES.

W. I. de C. Wheeler, F.R.C.S.I.

Skillern¹ points out that cysts of the short bones of the extremities have received little or no attention. He gives two examples of cysts the size of a pea in the extremities of a metacarpal bone following a trauma. These were detected by close scrutiny of the x-ray photographs, but there was no enlargement or sign of inflammation in the bone. He refers to three cases recorded by Robert Jones of large cysts in the bones of the hands. In contrast with these, Skillern's two cases showed no enlargements before operation. No pathological examination was made, and he thinks that the two cysts were of the nature of hæmorrhagic osteomyelitis. This term is meant to embrace traumatic localized non-infective lesions that have their onset in spongy bone. The pigments of the blood being absorbed, leave clear contents, just as occurs in some cysts of the soft tissues.

Skillern draws the following conclusions from his two cases: (1) Cysts of bone should be detected in their incipient stages before extensive destruction of the medulla; (2) Early operation results in prompt cure; (3) A localized trauma followed by persistent but not severe pain, and localized wincing tenderness, should arouse suspicion of minute bone cyst.

REFERENCE.—¹*Jour. Amer. Med. Assoc.* 1914, ii, 2272.

DACRYOCYSTITIS, INTRANASAL OPERATION.

J. S. Fraser, M.B., F.R.C.S.

The intranasal operation on the tear sac introduced by West appears to be gaining ground in America and in this country. Hanger¹ enumerates the following operations for the cure of dacryocystitis: (1) Slitting the lower canaliculus. (2) The use of probes and irrigation: (Intranasal operation is not justified until these methods have been faithfully tried). (3) Extirpation of the lachrymal sac, which causes scarring and leaves the patient with an annoying epiphora. (4) Toti's operation consists in making an opening externally over the lachrymal sac and removing the bone so as to expose the mucous membrane of the middle meatus. A hole is then made into the sac and one in the nasal mucous membrane. The edges of the two openings are then united by fine sutures. This operation leaves a scar, and in many cases the internal opening slowly closes. (5) The window resection of the lachrymal canal is performed from within the nose. Part of the ascending process of the superior maxilla and part of the lachrymal bone are chiselled away so as to expose the lachrymal sac, which is then opened. West claims to cure 90 per cent of his cases (*MEDICAL ANNUAL*, 1915, 366). (6) Yankauer tries to preserve the long arm of the lachrymal siphon, and therefore dissects up a mucoperiosteal flap from over the site of the lachrymo-nasal duct. (This operation is too complicated to be explained without the aid of diagrams). Hanger himself operates with the patient in the sitting position, and uses local anæsthesia. A few drops

of equal parts of a 20 per cent solution of cocaine and adrenalin (1-1000) are injected into the lachrymal sac. A small lachrymal probe coated with cocaine powder is now passed into the sac, and the cocaine worked down into the nasal duct. In a few minutes the canal is anæsthetized, so that larger and larger probes can be passed into the nose. Theobald's No. 13 is now left in situ. The inferior turbinal and the region of the nasal duct are then anæsthetized, special care being given to the under surface of the inferior turbinal. The anterior third of the turbinal is now removed, exposing the lower end of the lachrymal probe. It may now be necessary to chisel away the lower anterior part of the lachrymo-nasal duct, but in many cases even without this procedure it is possible, on slowly withdrawing the lachrymal probe, to introduce the male blade of the special punch forceps into the canal, and so to bite away the inner wall up to a point beyond the stricture. The duct is thus converted into an open gutter. The gutter can be extended into the sac if necessary. It is best to pack the nose for twenty-four hours, and to irrigate the lachrymal sac for a few days. Drainage of tears should be perfect in a week's time or less.

REFERENCE.—¹*Laryngoscope*, 1915, 23.

DEAFNESS. (*See also* AUDITORY NERVE; EAR, WAR INJURIES OF; OTITIS MEDIA; OTOSCLEROSIS). *J. S. Fraser, M.B., F.R.C.S.*

Anatomy of Congenital Deafness.—Oppikofer¹ records the results of the histological examination of the ears in four cases of congenital deaf-mutism. In all of these the changes were more or less the same. In all four cases there were marked changes in the membranous labyrinth, affecting especially the cochlear duct and the sacculus, and consisting in the marked atrophy or absence of the end organs (Corti's organ, etc.). The nerve and ganglion cells belonging to these parts were also absent or atrophied. In two of the four cases both cochlea and vestibule failed to react, and in these the whole membranous labyrinth was completely atrophied, but in the other two the pars superior (i.e., the utricle and semicircular canals) was normal. Only in these patients did the vestibular apparatus react to rotation, caloric, and electrical tests. Two of the cases showed changes in the cochlear duct—the result apparently of intra-uterine inflammation. Both of these patients were deaf from birth, and belonged to families in which other cases of congenital deafness had occurred. In two of the cases during life, certain tuning-forks were heard for a short time if strongly struck, and yet microscopic examination showed that in all coils of the cochlea, Corti's organ was reduced to a low mound of undifferentiated cells.

Bilateral Lesion of the Auditory Centre.—Guthrie² has only been able to find records of six cases of this condition.

Noise Deafness.—The subject of 'noise deafness' is of great importance at the present time. Rodger³ agrees with Dan McKenzie that the form of ear trouble usually known as 'occupational deafness,' which affects blacksmiths, boilermakers, railway and factory

employés, engineers, and others, is better termed 'noise deafness.' Wittmaack's experiments appeared to demonstrate that bone-conduction was of great importance in the production of noise deafness.

Yoshii, on the other hand, found that one animal, which suffered from unilateral middle-ear disease and had been exposed to noise like the others, had no affection of the cochlea on the diseased side, while the other cochlea presented the usual marked appearances (degeneration of Corti's organ, vacuolation and shrinking of the spiral ganglion cells, beading or segmentation of the nerve fibres).

Habermann, in his five post-mortem cases in men who had suffered from 'noise deafness,' records one with unilateral middle-ear disease. The inner ear was intact on the side of the middle-ear lesion. Habermann considered that in 'noise deafness' the disease was primarily in Corti's organ, with ascending degeneration in the nerve. The ganglion cells were affected to a much less marked degree.

Rodger's own investigation included forty-eight men—boilermakers and riveters. Of these, twenty men had been less than ten years at work, and it was found that in them the 'noise deafness' did not principally affect the perception of high tones as had hitherto been generally accepted. In fact, the upper tone limit was practically normal (17,000 to 18,000 double vibrations per second). There was, however, marked loss of hearing for tuning-forks in the lower part of the scale, corresponding to the noises which predominated in the shipyards. Roger considers that the pathological condition involved is an exhaustion atrophy from over-excitation affecting primarily the parts of the cochlear duct which correspond to the prevailing sounds. In those men who had been from ten to thirty years at work there was considerable reduction in the hearing, not only for the lower, but also for the upper tones. This latter condition was still more marked in men who had been employed for over thirty years, though in this latter group senile deafness had also to be reckoned with. Habermann has examined microscopically the ear of an old boilermaker, and found a preponderance of atrophy in the lower part of the cochlea. He believes that this may be due to a poorer blood-supply. In senile or arteriosclerotic deafness this area is the first to be involved. Rodger suggests that this part of the cochlea is the most delicate and highly developed, and is therefore the most vulnerable. In railwaymen exposed to the shriek of the engine whistle, Putelli (Venice) has found direct injury to the part of the cochlea concerned in the perception of high notes.

With regard to tinnitus or subjective noises in the ear, 56 per cent of Rodger's cases gave a history of this symptom in the early days of their work as boilermakers. The apprentices said that they suffered from noises after leaving their work at night. Rodger obtained a history of giddiness in 10 per cent of cases, and regarded it as an indication of slight concomitant disturbance of the vestibular apparatus. He applied the cold caloric test in some cases, and confirmed the results previously obtained by Dan McKenzie, that in cases of

'noise deafness' there is diminished sensibility of the vestibular apparatus.

TREATMENT.—Rodger agrees with other writers that it is useless to provide a rubber mat for the boilermakers to stand on, as the sounds are conveyed by air and not by bone-conduction. Different materials have been recommended for occluding the external auditory meatus, e.g., rubber, celluloid, cotton-wool, cotton-wool smeared with vaseline, clay fibre, jeweller's wax, etc. The great difficulty is to get the workmen to use the plugs regularly, though they usually insert cotton-waste in their ears when engaged in 'caulking' or 'holding on,' during which they are inside a boiler with several men hammering on the outside. Otherwise they take no precautions, the opinion being a fixed one among them that nothing will prevent the deafness. Rodger suggests that it should be made incumbent on the foremen to see that preventive measures are regularly made use of. In recent years it has been made one of the duties of gunners in the British Navy to see that their crews are supplied with ear-plugs.

The Psychology of Deafness.—Kerrison¹ maintains that there is a psychological as well as a pathological factor in most cases of advanced deafness. Two individuals in whom careful hearing tests show the same degree of deafness may differ greatly in their power of interpreting conversation. Such differences may be due to the fact that one deaf person has a quicker and more synthetic type of mind, enabling him to grasp quickly the meaning of a sentence imperfectly heard. He also points out that certain deaf individuals gradually and subconsciously surrender their place in the social and working world around them. Such people, realizing that they are at a disadvantage, shun society and make no productive effort. They explain all the shortcomings of their lives as the result of their deafness. Thus a vicious circle is set up. To combat these tendencies it is essential that the patient be stimulated to sustained effort in his own behalf. Patients with quick minds catch a word here and there, and from these deduce the words which have escaped them. They may even lose whole sentences and yet be able to pick up the line of thought from what follows. This may be compared to the stage at which every linguist arrives in the study of a foreign language when he is able to follow the drift of a conversation though words, and even sentences, escape him. A deaf patient should seek frequent opportunities for conversation with as many different people as possible, though with only one at a time. He must practise the habit of undivided attention, and must not worry if he cannot hear every word which is spoken. He must try to deduce, from what he does hear, the general trend of the conversation, and resist the inclination to unnecessary interruption. Lastly, he should cultivate the habit of lip-reading which, according to Pearce, is a universal faculty, i.e., a faculty possessed by those of normal hearing as well as by the deaf. Kerrison himself is conscious of some impairment of hearing, but still finds no difficulty in general conversation, and can enjoy a play

from most seats in the stalls. He at once took up the study of lip-reading, and now, by watching the lips of patients, he has no difficulty in determining if they answer correctly to hearing tests.

Ethel M. Hilliard,⁵ at the St. Louis Medical Society, explained that they based their phonetic work on the system of 'visible speech' invented by Alexander Bell. Dumbness was merely the result of deafness. A young hearing child listened for the first year of its life, and then began to imitate sounds, words, and finally sentences. The deaf child had the same organs of speech as the normal child, but did not learn to use them because he did not hear the speech of others, and hence could not imitate it. A means of communication had to be established between the teacher and the deaf child, whereas the hearing child already had speech and language fairly well developed before he came to school. A child's mind developed in the same way, whether hearing was present or not, but the difference became marked when the hearing child began to reach out for information by asking questions. For this reason it was most important to give the deaf child a means of communication with the world as early as possible. The instinct for speech developed in the second and third year of the ordinary child's life, and it was much easier to acquire it at this period than later. The deaf child should be talked to all the time. It was surprising what it was possible to do with deaf children of two years of age in the way of teaching them lip-reading and speech. An uneducated deaf child of five or six years did not know the meaning of speech and language. He did not know that objects had names, and was puzzled by what he saw other people doing with their lips. Heretofore he had been able to communicate with others only by means of gesture—an inadequate method of expression.

Normal people, said the speaker, learnt their speech sound by sound as hearing babies; they then combined their sounds and babbled in syllables before they attempted words. The same process had to be followed by the deaf child, except that the latter had not the ear to guide it, and so had to be taught to imitate the positions of the organs of speech. For this the child had to use his eyes and his sense of touch—in fact the other senses of the deaf child had to take the place of the sense of hearing. These other senses must be thoroughly educated. The sense of touch is educated by the handling of various objects while the child is blindfolded. Rhythm and accent are learnt by musical vibration, and also by the child placing his hand on the chest and neck of his teacher. At last a stage is reached at which the child has perceived the vibration in the teacher's throat, and is ready by imitation to reproduce the vibrations himself, with his lips, tongue, and palate in a position indicated by the teacher. Thus he acquires his first vowel sound. Consonants and vowels are soon combined into syllables, and then the young pupil begins to make words and sentences. In the meantime lip-reading has been going far ahead of speech. Nouns are learnt first,

then verbs. The order of proceeding is—lip-reading, speech, writing. In the Barry "five-slate" system the blackboard is divided by vertical lines into five columns. The name of the actor is written in the first (or subject) column, and the verb, which tells what is done, in the second (or predicate) column. The third column is reserved for the object, the person or thing receiving the act; the fourth for the preposition, and the fifth for the object of the preposition. The purpose of the first year's work is to give the child expression for the experiences of everyday life, but the result is largely dependent on the ability of the individual child. In the second year's work the vocabulary is rapidly built up and new tense forms are given (originally deaf children are always taught the past tense, because when the child is ready to tell what he has done, the action is already completed). In the second year, also, there is some branching out into fields of thought outside the knowledge gained through the senses, and the pupil is encouraged to ask questions.

The piano, Dr. Hilliard pointed out, is of great use in cultivating the voices of deaf children. The aim is to banish from their speech the deadly monotony which characterizes the voices of people who cannot hear their own tones. The piano is also used for giving correct accent. Rhythm, taught by means of vibrations felt through the piano case, and also through the floor, gives the idea of the regular beat in musical measures, and the perception of the accented beat forms the basis for accent in words. The pleasure derived by the deaf child from musical vibration and rhythm is very evident. If a deaf child is asked to pronounce such a word as 'capitulate,' she at first gives the same value to each syllable, but when she is given the chords on the piano, one of which is accentuated to correspond with the proper accent of the word, she immediately gives the word its correct pronunciation. It is most important to conserve any residual hearing that may be present, and for this purpose elementary sounds are first spoken in clear tones, and later, words and sentences are taught. Further on the deaf children study history, geography, arithmetic, just as hearing children do.

Statistics show that about 20 per cent of all pupils in the public elementary schools have more or less defective hearing. By means of lip-reading, which trains the eye to assist the ear and thus relieves the strain on mind and nerves caused by defective hearing, the task of learning becomes a vastly easier matter.

Action of Quinine and Salicylic Acid on the Spiral Ganglion.—Wittmaack⁶ found changes in the cells of the spiral ganglion in quinine poisoning. These appearances were similar to, but more marked than, those found in other nerve-cells. These latter recover quickly from quinine poisoning, whereas the hearing disturbance remains. Ischæmia would explain the phenomenon, as it would deprive the affected cells of nourishment. Schroeder and Hinsberg⁷ could not find any evidence of elective action of quinine on the cells of the spiral ganglion. The same holds good with regard to sodium

salicylate. Disturbance of hearing and nystagmus were apparently observed in some of the animals, but the authors could not relate these to post-mortem changes.

Sonorous Vibrations in the Treatment of Deafness.—Hubby³ believes that sonorous vibrations, not too long continued and not too intense, have a stimulating effect on the metabolism of all living cells. The Zünd-Burguet electrophone produces siren-like scales in three timbres corresponding to the three registers of the human voice. Each register has a scale of over an octave. Zünd-Burguet starts in the middle register, proceeds to the low, then back to the middle, then up to the high, and finally back to the middle register again. Each note is produced for only a small fraction of a second, but each is sounded at least twice for each ear. The ears are tested at the start of the treatment, and again after 15, 30, and 50 séances. Acute and subacute conditions require treatment once a day, while the chronic usually need two a day. The usual course of treatment comprises fifty sittings. Six months later a second course is necessary in the majority of cases. Hubby concludes that out of 27 cases, tinnitus was removed in 9 and improved in 12, while neuralgia was removed in 16 and improved in 4. Contra-indications for treatment are acute purulent conditions, acute lesions of the inner ear, cases with great fatigue of the nervous system, and absolute nerve deafness. [It certainly cannot be said that the treatment of deafness and tinnitus by sonorous vibrations is making any headway.—J. S. F.]

REFERENCES.—¹*Zeits. f. Ohrenheilk.* lxxii, 1; ²*Jour. Laryngol.* 1915, 177; ³*Ibid.* 91; ⁴*Laryngoscope*, 1915, 257; ⁵*Ibid.*; ⁶*Zeits. f. Ohrenheilk.* li, 101; ⁷*Ibid.* lxxiii, 65; ⁸*Jour. Amer. Med. Assoc.* 1914, ii, 2220.

DEMENTIA PRÆCOX.

Bedford Pierce, M.D., F.R.C.P.

Its subdivision into three groups finds, according to Goodall,¹ no support from histology. The changes in the brain are in no way peculiar, and occur in many acute mental disorders. They are found throughout the brain, are degenerative, they affect the ectodermal elements to a much greater extent than the mesodermal, and they show no signs of inflammation. If these observations are confirmed, they may assist in distinguishing dementia præcox from dementia paranoides.

Goodall also discusses the metabolic changes in dementia præcox, and quotes a number of authorities on the subject. The conclusions are, briefly, that there is a retention of nitrogen in the acute phases, with increased excretion of phosphorus and sulphur. In the hebephrenic variety there is diminished oxidation, the amount of oxygen absorbed and carbon dioxide excreted being considerably reduced. In stuporous cases there is a reduction of bodily heat, the heat produced being 39 per cent below normal. All of this points to a marked reduction in metabolic activity in this disease.

Referring to the blood, Goodall states that there is a moderate increase in the white-cell count, with relative increase of neutro-

philes, which increase becomes more marked during exacerbations, but disappears as the disease advances. As the dementia advances, there is a relative lymphocytosis with a low total count.

The value of injections of nucleinate of soda in dementia præcox is far from determined. Donath and Lundvall give a recovery-rate of 57 per cent; Schmidt 16.2; but Lépine had had no success in thirteen cases. Goodall, when quoting these statements, does not offer any further opinion than by saying that the "dogma that no measures can interrupt or modify the course of diseases of this type" is not correct.

Stoddart states that there is a remarkable psychological resemblance between dementia præcox and hysteria, and the complexes and the mechanism of their repression are the same. He says it is not yet settled whether it is a psychogenic or organic disease; but he refers to Mott's discovery that certain glands possessing internal secretions, especially the ovaries and testes, are atrophied in dementia præcox.

George H. Kirby² discusses the value of the catatonic syndrome in prognosis. He quotes Kraepelin as stating that 15 per cent of his catatonic cases recover. Where the stupor is the chief symptom, Kirby considers the prognosis good. Unfavourable indications are a long history of failure of adaptation to surroundings, and the development of mannerisms, negativism, and fixed postures. He concludes that catatonic symptoms alone do not permit a correct forecast to be made.

Dr. Laura Foster,³ who examined the ovaries of patients dying during the child-bearing period of life, found that cases of dementia præcox exhibited signs of early involution, accompanied by an increase of connective tissue and a great scarcity of Graafian follicles. This, if confirmed, is important in two directions: it supports the view that this disease is dependent upon retrogressive changes in the ovaries, and it shows that insanity of this type tends to its own extinction.

On the other hand, Dunlop Robertson⁴ considers that in dementia præcox there is hypersecretion of adrenalin, which in hebephrenia causes cerebral anæmia by its vasoconstrictor function, whilst in catatonia, in addition to this, there is a general toxæmia affecting both the muscles and the nervous system. He further claims that a qualitative test of catatonic blood-serum for adrenalin is affirmative, and shows that it is excessive in quantity. The evidence on which these statements are made is not very conclusive. It turns upon the effect of a saturated solution of potassium bichromate upon blood-serum, a deeper coloration being produced in the serum of a catatonic patient than in a control case. This is assumed to be similar to the brown coloration produced by this agent in chromaffin tissues, and also in solutions of adrenalin chloride. The number of cases dealt with was admittedly very few, and it would seem unwise to lay much stress on these experimental results.

An interesting remark on dementia is made by Robert Stewart Millar,⁵ illustrating the difficulty of understanding the mental state of a patient who appears demented. "When making a mental examination of a female patient, the last note on whose case sheet ran as follows, '*In statu quo* dull and demented,' we found little evidence to show that the dementia was emotional and not genuine in character, until asking the patient to wake up and take a little more interest in her surroundings we received the startling answer which taught us a severe lesson. 'But doctor, how can I find time to take an interest in my surroundings? I am busy enough as it is.' That many so-called cases of dementia are not genuine cases of dementia, but are what Hart⁶ refers to as cases of emotional dementia, is well known. We are all aware that a demented patient periodically acts in a rational manner, and it is this which has led Brill to say that dementia præcox is often neither a dementia nor a præcox."

In an examination into the margin of error in the diagnosis of mental disorders, Southard and Stearns⁷ found that alterations in diagnosis were more frequent in dementia præcox than in any other form of insanity. Of 131 alternatives in diagnosis, 42 related to this disorder (32 per cent); of these, in 20 the change was from dementia præcox to manic-depressive insanity, and 15 in the reverse direction. Seeing the ill-defined nature of the symptoms and the lack of any pathognomonic features, it is not surprising that the changes of diagnosis have been so numerous. It should be noted that at the Boston Psychopathic Hospital, Kraepelin's classification is used exclusively.

REFERENCES.—¹*Lancet*, 1914, ii, 1287; ²*Amer. Jour. Insanity*, lxi, No. 5; ³*Jour. Ment. Sci.* 1915, 302; ⁴*Ibid.* 392; ⁵*Psycho-analytic Rev.* 1915, 150; ⁶Bernard Hart, *The Psychiatry of Insanity*; ⁷*Boston Med. and Surg. Jour.* 1914, ii, 895.

DERMATITIS.

E. Graham Little, M.D., F.R.C.P.

Copra Itch.—In the MEDICAL ANNUAL, 1915, a short abstract was given of a paper by Castellani, describing a characteristic eruption which occurred in workers in copra, and was demonstrated to be due to the presence of an acarus derived from that material. Macleod¹ contributes a short note of a case in which the diagnosis of copra itch was made, but the parasite itself was not identified. The patient was a dock labourer, who had been employed in unloading broken cocoanut or copra, which emitted a fine brown dust. After several days spent in this work he developed an acute erythematous dermatitis of the face, with much œdema, and an eczematous weeping eruption of the hands and forearms. Of nine other men employed in the same task, six developed similar symptoms. Whitfield² reported a similar case in a stevedore, handling copra, who had had two attacks. The eruption consisted of numerous single and grouped follicular papules, generalized over the extremities but not found on the face. Whitfield demonstrated at the Dermatological Section of the Royal Society of Medicine an acarus isolated from copra, which he recognized

as that described and figured by Castellani, and named after him *Tyroglyphus longior gervais*, var. *Castellani*.

The disease disappeared very rapidly under treatment when the contact with the infected material ceased.

Cotton-seed Dermatitis.—Nixon³ reports an interesting case of dermatitis occurring in a dock labourer handling, on arrival at Bristol, a cargo of cotton-seed from Alexandria. Several of the men working on the same job were attacked and seen by Nixon, who was able to demonstrate a living parasite in the cotton-seed. Two-thirds of some fifty contacts were affected. The parasite was regarded by one expert who saw it as allied to the *Pediculoides ventricosus*, but not identical with it. By another expert it was classed with the *Tarsonemidae*. The eruption appeared within a short time of the men handling the goods, at first as an urticarial papular, and later as a bullous, lesion, situated chiefly on the neck and forearms, and restricted to uncovered parts. Each papule was pinkish-red, hard, raised, and about the size of a pea. There were no burrows. The rash died out within a week if not renewed by fresh contact.

REFERENCES.—¹*Brit. Jour. Derm.* 1915, 118; ²*Ibid.* 125; ³*Ibid.* 122.

DERMATITIS HERPETIFORMIS. *E. Graham Little, M.D., F.R.C.P.*

An interesting debate on this subject was held at the Dermatological Section of the Royal Society of Medicine,¹ introduced by a paper by Macleod under the title "The Pemphigoid Eruptions.*" It was explained that the title was intended to include eruptions of the dermatitis herpetiformis type, and three characteristic features were claimed for the group, namely, (1) Multiformity in eruption; (2) Herpetiform distribution; (3) Intensity of subjective symptoms. These are chiefly relied upon to distinguish this group from chronic pemphigus, and the introducer claimed that the absence of any one of them rendered the diagnosis uncertain. In the subsequent discussion it became apparent that this claim was not generally conceded. Less constant features of the group are a comparative maintenance of good health, infrequent implication of the mucous membranes (recorded in less than a quarter of the cases noted), a fairly frequent but by no means constant increase in eosinophile corpuscles in the blood, and a certain preponderance of indicanuria. The disease may occur at any age, but is commonest between 20 and 40, and is rare in children. On the latter point there was much divergence of opinion, and it resolved itself into the question of nomenclature, whether pemphigus or dermatitis herpetiformis was better expressive of the bullous eruption in children which, recorded under one or other of these designations, is not uncommon. Although it was stated that pregnancy was the most definite determining cause, with disorders of menstruation next in importance, in the cases collected, numbering 108, males were slightly in excess of females (57 against 51). The part played by nerve influences was also controversial. The production of some eruptions apparently as the result of taking arsenic,

which is also known to cause herpes zoster occasionally, and the recording of a considerable number of cases of dermatitis herpetiformis in association with attacks of herpes zoster, might be regarded as arguments for some similarity between the causes of these two affections; but the complete absence of post-mortem changes in the former disease, and the constancy of these changes in the latter, militate against any approximation. The introducer therefore favoured the view that the cause is to be sought in some autogenous toxæmia, not necessarily of a specific nature, which may be called forth by a variety of influences, and most probably acts indirectly on the skin through the nervous system.

TREATMENT.—The efficacy of **Arsenic** in controlling the eruption was differently represented by different speakers. It required to be pushed to the limit of toleration. **Antimony** might sometimes be substituted for it with advantage. **Salvarsan** had given some good results, but was on the whole a disappointment. For the relief of the irritation, which was often agonizing, **Antipyrin**, **Phenacetin**, **Quinine**, **Salicin**, and even **Opium** and **Morphia**, had to be employed. **Lumbar Puncture** was praised by some authors, but seemed most uncertain. Injections of autogenous **Serum** or blood were successfully employed by one speaker, but in too small a number of cases to warrant any general conclusion. A strictly **Vegetarian Diet**, and restriction of food for a time to practical starvation point, sometimes benefited the itching. Locally, antipruritic and antiseptic lotions or ointments were sometimes effective in checking itching and pustulation. In a few cases where definite symptoms of colitis had been associated with the eruption, autogenous **Vaccines** had been used with good effect.

REFERENCE.—*Brit. Jour. Derm.* 1915, 201, 205.

DIABETES. (See also KIDNEY, DISEASES OF.) *Francis D. Boyd, M.D.*
John D. Comrie, M.D.

Comparatively little work along new lines has been done during the past year upon the pathology of diabetes mellitus. Various workers have, however, continued investigations in the direction of determining its relation to the secretions of the pituitary and other internal secreting glands, and its connection with disease of the duodenum and with intestinal toxæmia. Others have pursued such questions as the effects produced by acidosis, the concentration of sugar in the blood, the excretion of carbon dioxide, and the presence of sugars other than glucose in the urine.

The pressure of the alveolar carbon dioxide in the lungs can be readily estimated by means of special though not complicated apparatus, and forms a convenient method for the determination of the degree of acidosis. The greater the amount of diacetic, oxybutyric, and the other acids responsible for diabetic coma that is present in the arterial blood, the more carbonic acid is eliminated in order to restore its alkalinity. Thus, the pressure of the CO_2 in the lung eoli, which keeps in equilibrium with the arterial CO_2 , may fall

from the normal 5 per cent or over to as low as 2 per cent in bad cases of acidosis. This percentage is determined by Poulton¹ with Fridericia's carbon-dioxide tensimeter, and is stated by him to be a sure guide to the severity of the acidosis present, and thus to afford a valuable clinical method when one has regard to the difficulty or impossibility of directly estimating these acids. The usual methods in vogue for determining the degree of threatened acidosis in diabetes are the estimation of the total ammonia or total acetone in twenty-four hours' urine, or the ratio of ammonia nitrogen to total nitrogen in a given specimen. But all these are laboratory methods, and at best are laborious. For that at present under discussion, however, Poulton claims that it is simple, that the apparatus is easy to use and can be carried about from case to case, and that although the technique requires but little practice, the results are of a high degree of accuracy and of the greatest significance in treatment and prognosis. The apparatus consists of a U-shaped glass tube, of which one limb, with capacity of about 100 c.c., is wide, and can be cut off by means of two glass stop-cocks. Through this tube the patient blows as hard and as quickly as he can, thus filling it with his alveolar air; 10 per cent caustic soda solution is thereafter introduced by one of the stop-cocks into the wider limb; upon a scale on the latter, after half a minute's shaking to allow of absorption of the CO_2 by the alkali, the percentage of CO_2 is directly read. From observations on a series of 86 normal individuals, Poulton found that the mean CO_2 percentage varied in health between 4.94 per cent in girls to 5.51 per cent in men. In cases of actual or threatened diabetic coma, however, he found it was never higher than 2.49 per cent, while it might sink as low as to 0.86 per cent. Beddard, Pembrey, and Spriggs,² in another research, corroborate the figures given above for the amount of carbonic acid contained in the alveolar air of healthy persons and of comatose patients. They used the method of Haldane and Priestley, and found that in non-comatose cases of diabetes the volumes per cent of CO_2 varied from 4.98 to 6.99, while a series of observations made on comatose patients gave figures varying from 1.08 to 2.55. In two cases which recovered from coma, a series of observations made during the two or three weeks occupied by recovery showed a rise in the one case from 1.08 to 4.62, and in the other case from 2.64 to 4.91.

Rosenbloom³ draws attention to the fact that a form of diabetic coma occurs in which there does not appear to be any intoxication with the acetone bodies, and suggests that in such cases the poisonous substances may be of the nature of amino-acids or polypeptides. He had three cases in which the diabetic symptoms were severe, with no tolerance for carbohydrate and no lessening of the glucose secretion, when the protein intake was diminished. The urine contained a normal amount of ammonia nitrogen, and showed no trace of acetone, diacetic acid, or oxybutyric acid; but there were excessive amounts of colloidal nitrogen, neutral sulphur, and

amino-acids. In one of these cases the blood was examined shortly before death, and only faint traces of acetone bodies were found; in this instance a peculiar feature was the presence of an enormous number of granular tube-casts in the urine, appearing two days before death and rendering the urine quite cloudy. Coombs⁴ has described a type of acidosis occurring as a terminal symptom in chronic myocardial disease where acetone diacetic acid and oxybutyric acid were likewise almost completely absent from the urine.

The condition of the pituitary gland in diabetes appears to have been investigated in a systematic manner for the first time by Fry.⁵ As the result of examination of this gland in eight cases dying of diabetes, he found that definite histological changes occur in the anterior lobe, consisting of an increase in the chromophil cells, conversion of these into colloid or granular masses, and the presence of degenerated areas, often of large size. The severity of the glycosuria appears to be definitely reflected by changes in the pituitary gland. Thus, when the amount of sugar is small, the masses of chromophil cells are evident, but there is little colloid formation. On the other hand, cases in which the sugar has been abundant during life show marked colloid invasion or extensive areas of degeneration. It is evident that these changes are not merely secondary phenomena, because the posterior lobe of the gland is quite unaffected even when the anterior is markedly diseased. Changes in the pituitary gland do not appear to be related to even advanced disease in the pancreas.

Intestinal toxæmia causing prolonged injury to the liver and pancreas, with the production of alimentary glycosuria, is suggested by Croftan⁶ as one of the causes of permanent diabetes. The condition of the duodenum has been investigated by Mutch,⁷ who attributes the determining factor in the production of diabetes mellitus to chronic inflammation of this part of the alimentary canal, associated generally with ileal stasis, which aggravates the condition in proportion to its severity. As a result of x-ray examination and orthodiagraphic measurement, he found that the average vertical length of the duodenal shadow in healthy adults was $3\frac{1}{2}$ in., or two lumbar vertebræ and discs. In diabetes mellitus he found this vertical length varied from 3 to $3\frac{1}{2}$ vertebræ or from $4\frac{1}{2}$ to $5\frac{1}{2}$ in., and was accompanied by an increase in calibre of the tube. On examination after death, he found also that the walls were thicker than normal, and that these changes extended down into the jejunum. He also found that almost all diabetic patients excreted indican bodies in the urine, but that the excretion of these bodies, due to the action of *B. coli* on tryptophan and tyrosin in the small intestine, bore no relation to the severity of the diabetes.

The concentration of sugar in the blood as estimated by Bang's micro-method has been studied for health and for various diseases by Hopkins.⁸ A brief description of this method was given in the MEDICAL ANNUAL for 1915, p. 212. Hopkins finds that the concentration of sugar in the blood of normal people varies between

0.065 and 0.1 per cent. An administration of 100 grams of glucose produces only a transitory fluctuation, a rise in the blood-sugar commencing within five minutes of administration, reaching its height in about half an hour, and subsiding to normal in two hours. In diabetes, the most characteristic symptom of the disturbance in carbohydrate metabolism is the increase in the sugar content of the blood. Hyperglycæmia may exist for a considerable time before there is any glycosuria, and therefore an earlier and more reliable criterion of diabetes than urinary examination is found in a study of the blood-sugar. In diabetes the amount of blood-sugar may be double or treble the normal, and, when glucose is administered as above, there is great delay in the appearance of excess in the blood (half an hour to three hours), while the excess is very greatly prolonged. To a less degree this alimentary hyperglycæmia takes place in pancreatic, nephritic, and pituitary disease, and it is also found to some extent in pneumonia, typhoid fever, tuberculosis, apoplexy, and occasionally in cancer. Hopkins regards the test, on account of its accuracy and simplicity, as a practical method for early diagnosis, and also for control of dietetic treatment.

The presence of a lævo-rotatory substance in the urine in cases of diabetes and other conditions is well known, and recently Cammidge and Howard⁹ have investigated the nature of this body. They find that in reality it is not lævulose, but a ketone body, isoglycronic acid.

TREATMENT.—A method of treatment in cases of diabetes which prove refractory to ordinary antidiabetic diet by means of **Casein** and **Cream** is recommended by Williamson.¹⁰ The patient is kept in bed, and every two hours from 8 a.m. to 10 p.m. receives a glassful of artificial milk prepared from casein, cream, and water. It is prepared by mixing one tablespoonful of casein with one tablespoonful of cream to form a paste, which is then stirred up with hot water slowly added till the tumbler is full. If the patient, after a day or two, finds this diet insufficient, it may be supplemented by beef-tea and buttered eggs, and a casein pudding may be added, prepared thus: One tablespoonful of casein, one egg well beaten up, a small pinch of salt, one teaspoonful of baking powder, a little water if necessary; mix well, add the baking powder at the last; bake like a custard for thirty minutes. Other articles added subsequently to this diet are **Biogene**, tomatoes, mushrooms, gluten cakes, bacon, green vegetables, cheese, and claret, hock, and salutaris water. The results are often prompt, sugar disappearing from the urine after two or three days. The diet is inexpensive and is easily prepared, but it is found to cause exhaustion or dyspepsia in a small percentage of cases.

Several references have recently been made to the successful treatment of diabetes mellitus by the administration of the **Lactic Acid Bacillus**. Henderson,¹¹ having made a careful series of observations on four cases, both before and after a culture of this bacillus was

added to a constant weighed diet, does not come to a favourable conclusion either as regards diminution of the glycosuria or of acidosis.

Stress is laid by Freundlich¹² upon the frequency of association between diabetes and pyorrhœa alveolaris. When pyorrhœa is associated with this general disease, he finds it presents certain characteristic features but is very difficult to treat. In addition to the ordinary dental treatment and oral antiseptics, he finds that a specific remedy exists in **Emetine Hydrochloride**, of which he injects into the gums a 0.5 per cent solution every day or every other day according to the severity of the case.

In the course of his Bradshaw Lecture, Tirard¹³ reviews his experience of the effect of some commonly used drugs in this condition. Codeine he has, like others, found to diminish output of sugar and decrease thirst; but in large doses he considers it inadvisable, because the drowsiness which it causes so closely resembles the onset of diabetic coma. **Sodium Salicylate** he recommends highly, especially mixed with two or three times its quantity of **Sodium Bicarbonate**, and he finds this particularly helpful in abolishing from the urine the last traces of sugar, which has been reduced already by dietetic means. **Laxatives** of a mineral nature, e.g., magnesium sulphate and sodium phosphate, he has found much superior to vegetable purgatives. In massive doses the administration of these and of **Mineral Water** containing them diminishes the amount of acidosis and causes a rapid fall in the output of sugar. These large doses cause no greater purgation than moderate ones, and are to be given occasionally for several days in succession.

The method of treatment by **Fasting** has been greatly elaborated by Allen,¹⁴ with good results. Briefly put, his method consists in making the patient do without food entirely until the glycosuria ceases, and for one to two days beyond this. This fast may occupy from two to ten days, and during this period small doses of **Alcohol**, which neutralizes acidosis, may be given together with alkalis for the first few days. When the patient resumes eating, the food given is small in quantity, gradually increased; and **Green Vegetables**, either raw or boiled, form a specially favourable article of diet; the amount at first is 200 grams in the day, afterwards increased. This starvation treatment, introduced by Allen, is favourably reported on by Christian,¹⁵ who has found it to be a safe method, and who points out further that it shortens very materially the length of time required to get the patient sugar-free. Thus, taking eight cases treated by gradual carbohydrate reduction, the average time required to get them sugar-free was eleven days, while the average time required by the starvation method is three days. Time is therefore saved both to the patient and to the hospital. Hill and Sherrick¹⁶ also report favourably upon this form of treatment. After two days on hospital diet, they put the patient to bed, and give nothing save black coffee with one ounce of whisky every two hours from 7 a.m.

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to 7 p.m. When the urine becomes sugar-free, vegetables boiled twice (to remove the starch) are given for one day, and thereafter a gradually increased allowance of protein and carbohydrate.

REFERENCES.—¹*Brit. Med. Jour.*, 1915, ii, 392; ²*Ibid.* 389; ³*N. Y. Med. Jour.*, 1915, ii, 294; ⁴*Brit. Med. Jour.*, 1914, i, 1230; ⁵*Quart. Jour. Med.*, 1915, July, 277; ⁶*Med. Rec.*, 1914, ii, 1087; ⁷*Pract.*, 1915, May, 712; ⁸*Amer. Jour. Med. Sci.*, 1915, i, 254; ⁹*Lancet*, 1915, i, 320; ¹⁰*Brit. Med. Jour.*, 1915, i, 456; ¹¹*Jour. Amer. Med. Assoc.*, 1915, i, 495; ¹²*Med. Rec.*, 1915, i, 943; ¹³*Lancet*, 1914, ii, 1133; ¹⁴*Boston Med. and Surg. Jour.*, 1915, i, 241; ¹⁵*Ibid.* 929; ¹⁶*Ibid.* 696.

DIARRHŒA, EPIDEMIC (SUMMER DIARRHŒA).

Frederick Langmead, M.D., F.R.C.P.

Arthur J. Kendall¹ points out that although many hypotheses have been advanced as to the causation of summer diarrhœa, their underlying principles allow them to be reduced to three fairly distinct groups: (1) *The meteorological hypothesis*. This assumes that the high temperatures experienced in the summer months, usually in association with high relative humidity, initiate nervous and metabolic disturbances, particularly in young children, which lead to the symptoms. (2) *The physiological hypothesis*, which supposes that dietary indiscretion, or perhaps temporary inability of the young child to assimilate food, is the inciting factor. The wrong feeding may be further complicated by secondary endogenous invasion, leading to nervous and metabolic disorder, as well as to an intolerance for certain kinds of food. Carbohydrates and salts appear to be the food elements which most commonly lead to the condition. (3) *The bacterial hypothesis* asserts that specific bacteria or combinations of bacteria are the causal agents of certain of these diarrhœas. According to this view, the patient is a menace to other children.

Kendall considers there is no doubt that each of these hypotheses explains a certain number of cases, and it is probable that combinations of heat, unsuitable food, and bacteria are responsible for many others. At different seasons, one or other cause may be found to be the more important in the majority of the cases under observation. There is also presumptive evidence, he thinks, that the summer diarrhœas are different in type and severity in different countries. Thus, in Germany, the milk is usually boiled before it is given to infants, whereas in the United States it is not boiled as a rule. This may explain why bacillary dysentery and similar diseases of bacterial origin are comparatively rare in Germany, the organisms being non-spore-bearing and readily destroyed by the boiling, whilst, on the other hand, they are common in the United States. The severe bacterial infections differ from the cases produced by environmental conditions or by faulty feeding in one important particular. Even if the patient be seen in the early days of the disease, the fever persists for several days in spite of the withdrawal of food and the substitution of a proper environment, and he usually becomes progressively worse for a time. But the symptoms produced by the dif-

ferent forms of infection are so similar that it is necessary to resort to bacteriological methods to establish the correct diagnosis. The chief uses of such an examination are diagnostic and preventive. How they may influence treatment he illustrates by his experience of the epidemics of two successive years. During the first a large series of cases was treated indiscriminately with a preparation which was essentially buttermilk, with very favourable results. The same treatment was pursued during the second epidemic, but the results were very discouraging. The explanation was clear when the epidemics were studied from the bacteriological aspect. The predominating organism isolated during the first summer was the 'gas bacillus,' an organism which is most active in the intestinal tract when carbohydrates are present, but whose activity is restricted when protein replaces the carbohydrate. The addition of lactic acid appears to reinforce the favourable results obtained by giving protein and restricting sugars, and buttermilk, properly prepared, combines the advantages of a protein diet and lactic acid. The predominant organism during the second summer was not the 'gas bacillus' but the dysentery bacillus, an organism habitually proteolytic. It produces its poisons chiefly or solely in the absence of utilizable sugars. Buttermilk, therefore, had little or no influence in restricting its activity, but rather aggravated the conditions in the intestinal tract, particularly in the more severe cases.

This seasonal variation of the infection had not been recognized hitherto. At the Boston Floating Hospital during the summer of 1910, by far the greatest number of severe diarrhœa cases were due to dysentery bacilli, either of the Shiga or the Flexner type. In 1911, although the clinical picture was similar, the dysentery bacilli were comparatively rarely isolated, but streptococci were abundant. The sequelæ, also, were such as would suggest a streptococcal infection—general septicæmia, acute nephritis, middle-ear disease, and peritonitis. In the summer of 1912 another organism was dominant. This was the *Bacillus aerogenes capsulatus*, or gas bacillus. The symptoms resembled those of the former years, but the condition differed from that due to the dysentery bacillus, in that sugars were not only of no material assistance, but were distinctly harmful. During the following year (1913) another organism belonging to the capsulated group made its appearance. This organism appeared to be far less active than either of the others, and the cases were noticeably less severe in character. The bacilli were found even in the certified milk, and the simple expedient of boiling the milk not only prevented the infection but also appeared to help materially in the treatment of the patients.

When the infection is due to the gas bacillus, the chief macroscopical lesion is a necrosis of the solitary follicles. One of the most striking features is the definite harm produced by giving sugars, the temperature rising promptly and decidedly. Toxæmia is wanting, whereas in dysenteric cases it is prominent and often persists after

its cause has been removed, many of the patients being unable to rally and eventually dying from its effects.

Henry F. Helmholz² has extended his investigations into the relation of heat to the morbidity and mortality of summer diarrhœa. Forty-six children were studied. The conclusions he arrived at were that it is an improper adjustment of the individual to its surrounding temperature rather than the height of the temperature which helps to swell the total of deaths from intestinal disease during the summer, and that mothers should be educated to realize that, just as infants must be kept warm in winter, so must they be kept cool in summer.

REFERENCES.—¹*Boston Med. and Surg. Jour.* 1914, i, 851; ²*Jour. Amer. Med. Assoc.* ii, 1371.

DIPHTHERIA.

E. W. Goodall, M.D.

SYMPTOMS.—An interesting study of the heart in diphtheria by means of polygraphic records and post-mortem observations is published by Hume and Clegg.¹ They found a great variety of cardiac irregularity, for a detailed account of which the reader is referred to the paper, where reproductions of a number of tracings are given. In some of the cases examined post mortem, marked pathological changes were found (fatty degeneration of the heart muscle and slight myocarditis), but the authors found it "impossible to correlate the pathological lesions with the individual instances of arrhythmia of the heart. Irritative and destructive processes are taking place simultaneously, and result in excitation or depression of the various functions of the heart muscle. . . . Further, the type of arrhythmia in each individual case may vary from day to day, a variation which is in all probability dependent upon varying and progressive pathological changes in the heart muscle and its nerves. It may be asserted, however, that any form of arrhythmia of the heart (except sinus arrhythmia) in diphtheria indicates that the heart muscle or nerves are involved in a pathological process, however mild the illness may otherwise appear to be, and that special precautions are necessary to keep the patient recumbent."

TREATMENT.—In a short paper² on recent improvements in instruments for **Intubation** the writer has drawn attention to the difficulty often experienced in O'Dwyer's and Bayeux's instruments in withdrawing the obturator (or pilot) from the tube when the latter has been inserted in the larynx. Moreau's form of introducer obviates this difficulty. The obturator is short and hingeless, and very easily released from the tube. Moreover, the instrument is fitted with a whistle in the handle, in which a distinct whistling sound is heard at each expiratory effort of the patient, when the tube is in a proper position over the glottis.

PROPHYLAXIS.—In a previous volume of the **MEDICAL ANNUAL** attention was drawn to von Behring's attempts at immunizing human beings against diphtheria by the subcutaneous or, better still, the intracutaneous injections of a toxin-antitoxin mixture, which was

either neutral or slightly toxic to the guinea-pig. Park, Zingher, and Serota,³ in a paper on the subject, state that results as reported by different observers, which they quote, have not been uniform, and are, often, not distinctly stated. They give, therefore, their own experience in the scarlet-fever wards of the Willard Parker Hospital, New York. The results were controlled by determining, in some instances by Römer's, in others by Schick's method (see below), the natural immunity, before active immunization of the patients treated. They found that active immunization produced a very decided increase of antitoxin in a relatively short time in all persons who had natural antitoxin, and were naturally immune to diphtheria. In a series of 700 scarlet-fever patients of varying ages tested for natural immunity by Schick's method, 400, or 57 per cent, gave a negative reaction, and were therefore naturally protected. Less than one quarter of the remaining 43 per cent, who were probably susceptible to diphtheria, reacted to active immunization with sufficiently strong injections of the toxin-antitoxin mixture. They conclude that those persons who have been definitely exposed to infection should be passively immunized even if toxin-antitoxin injections have been given. Those who are found to be immune by Schick's test need not be immunized.

Moffett and Conrad⁴ studied the Schick reaction in 455 children up to fourteen years of age. This reaction is a cutaneous one designed to detect immunity against diphtheria, and consists of the intracutaneous injection of one-fiftieth of the minimal lethal dose for a guinea-pig weighing up to 300 grams. "Schick used as a basis for his observations the work of von Behring, who observed that as little as one-thirtieth of a unit of antitoxin per c.c. of serum will protect a person against diphtheria. If one-thirtieth of a unit or more antitoxin per c.c. of serum is present, there will be no reaction at the site of the injection; but if there is less than one-thirtieth of a unit of antitoxin per c.c. of serum, there will be a marked reaction within from thirty-six to forty-eight hours, characterized by redness, swelling, itching, and slight infiltration. This is a positive reaction, and means that the person injected has not sufficient antitoxin to neutralize the toxin injected, while, if it is negative, it indicates that there is circulating in the blood sufficient antitoxin to neutralize the toxin injected. The unneutralized toxin is the thing which produces the local reaction." Moffett and Conrad found a positive reaction in 48.5 per cent of the children they examined. The children were not suffering from diphtheria at the time. They give details of three cases in which the presence or absence of the reaction was of use in the diagnosis of a suspicious throat inflammation. They are of opinion that it would not be necessary to administer an immunizing dose of antitoxic serum to any child in whom the reaction was negative. They found in several instances that if one of the children of a family gave a negative or positive Schick reaction, all of the children in the same family gave a similar reaction.

Bundesen⁵ examined 800 persons, chiefly children, by the same test, and found that the reaction was positive in close on 40 per cent. Of 70 'carrier' cases, 70 per cent were negative and 30 per cent faintly positive, and not one frankly positive case occurred amongst them. Graef and Ginsberg⁶ found 46.3 positive cases amongst 82 persons of all ages. Out of 524 persons, mostly children, examined by Moody,⁷ 45.2 per cent were positive. This observer states that by making the Schick test at intervals before and after the administration of antitoxin in each of the three methods, subcutaneous, intramuscular, and intravenous, he has been able to confirm Schick's results, which show the greater immediate efficiency of intravenous administration and the relative greater efficiency of the intramuscular over the subcutaneous injection. He also examined 316 persons who four weeks previously had received an immunizing dose of 1000 units of antitoxin; he found that 24.5 reacted positively, rather more than half the percentage of positive reactions obtained in the non-immunized children. All the observers quoted state that the age-distribution of positive cases corresponds with the age-distribution of clinical diphtheria. They all of them, too, recommend that, in face of an epidemic, the test should be applied to all contacts, and that those in whom there was a positive reaction should be injected with a prophylactic dose of antitoxin; but Moody, however, states that a few cases of clinical diphtheria developed two to four weeks after such an injection had been given to some children in the St. Louis Children's Hospital.

R. Tanner Hewlett⁸ publishes the results of three more cases of persistent diphtheria infection treated by means of **Diphtheria Endotoxin**. He states that he has treated 24 cases of the kind by this method. Of these, in 17 the bacilli disappeared within a reasonable time after the use of the endotoxin; in 1 the bacilli did not disappear until seventeen days after the last dose, and in 6 the treatment was unsuccessful. He recommends doses of 0.5 c.c., 1 c.c., and (if required) 1.5 c.c. at intervals of about seven days. The endotoxin should be injected into the muscle of the upper arm or back, and gives rise to some pain, tenderness, or swelling, lasting a day or two, at the site of injection, and occasionally to some malaise, rash, and a rise of temperature.

REFERENCES.—¹*Quart. Jour. Med.* 1914, Oct., 1; ²*Pract.* 1914, ii, 564; ³*Jour. Amer. Med. Assoc.* 1914, ii, 859; ⁴*Ibid.* 1915, ii, 1010; ⁵*Ibid.* i, 1203; ⁶*Ibid.* 1205; ⁷*Ibid.* 1206; ⁸*Lancet*, 1915, i, 275.

DISSEMINATED SCLEROSIS.

J. Ramsay Hunt, M.D.

Collins and Baehr¹ analyze the clinical histories of ninety-one cases of disseminated sclerosis, and consider its frequency compared with other organic diseases, the etiology and pathogenesis, the various types and differential diagnosis of the disease, and its course and treatment. Among their more important conclusions are: That disseminated sclerosis is encountered much less frequently in the United States than abroad, which is due, in part only, to the fact that early and irregular

cases often escape recognition there. The fully developed, classical Charcot type of the disease is but rarely seen. Trauma, including occupation injury, intoxications, biological crises, mental shocks, etc., play only a contributing rôle in the development of the disorder. The disease is regarded by them as a parenchymatous degeneration due to the action of a toxin circulating in the cerebrospinal fluid.

There can be no rigid grouping of 'types' of the disease. Nevertheless, three general groups can be assumed: a spastic-paretic, an ataxic, and a hemiplegic group. The best single aid in the differential diagnosis is the condition of the cerebrospinal fluid. The Wassermann reaction is practically always negative. The number of lymphocytes is less than fifteen, and there is no excess of globulin. This is of special value in ruling out cerebrospinal syphilis. The remissions which sometimes occur are singularly characteristic of this disease. In their series, however, they were rarely encountered. The absence of the abdominal reflexes, upper and lower, is an important diagnostic sign.

The *visual disturbances* of multiple sclerosis are considered in some detail by Foster Kennedy.² Among the important, apart from the diplopia which is so common, are optic neuritis and retrobulbar neuritis, the symptoms of which are often characteristically evanescent and transitory. Two types of congestive phenomena may occur in the optic nerve in insular sclerosis—the papillo-œdema consequent on increased intracranial pressure, and that known as retrobulbar neuritis. The first is a purely mechanical condition, in which cerebrospinal fluid is forced from the main reservoir of the ventricles and the intradural space down the vaginal sheaths to appear at the point of lowest resistance—the nerve-head—whence it is drained into the sclera at a rate which varies with the type of formation of the eyeball—more rapidly and more effectively in myopic than in hypermetropic eyes. The second condition, however, has to do, not with the water-jacket of the optic nerve, but with the fibres themselves. As indicated by its name, the morbid process takes place posterior to the globe, is a true inflammation, and is accompanied from the beginning by rapid loss of function in the affected fibres which lie in the bony walls of the optic canal. This loss in visual acuity is produced at first by the deterioration in the macular bundle, and has as its consequence a central scotoma. Owing to the rigidity of the environment of the nerves, a degree of pressure will be produced which will quickly interfere with function; and, for the same reason, the degree of fluid transudation in the nerve-head will be less than is found in the mechanical abnormality first mentioned. In the latter, loss of visual function occurs but late in the disease, and takes the form of a gradually increasing concentric contraction in the fields due to an organization of the œdema into connective tissue. It follows, therefore, that as, in the case of retrobulbar neuritis, fibre constriction is produced by fluid exudate, and in pressure papillo-œdema by solid connective tissue, the chances of recovery from blindness due to the former are

much superior to those from blindness due to the latter; and it may here be said that permanent loss of sight practically never occurs as a result of insular sclerosis, however acute may be the initial seizure.

REFERENCES.—¹*Amer. Jour. Med. Sci.* 1914, ii, 495; ²*Jour. Amer. Med. Assoc.* 1914, ii, 2001.

DIVERTICULITIS.

X-ray diagnosis in (p. 50).

DRUMMER'S PALSY.

J. Ramsay Hunt, M.D.

Extensor paralysis of the distal phalanx of the thumb, from spontaneous rupture of the tendon of the extensor pollicis longus, is a very rare occurrence. It is most commonly met with in drummers, and was long supposed to be of neuritic origin. Rupture of the tendon takes place at the wrist just after its emergence from beneath the annular ligament.

The symptomatology is essentially the same in all of the cases, namely, a sudden extensor paralysis of the ungual phalanx of the thumb, which may or may not be preceded by pain or soreness along the course of the tendon. The actual rupture may occur quite painlessly; but more frequently a sharp, piercing pain is felt over the back of the wrist, often shooting up into the forearm. The tendon may be swollen and tender, and if ruptured, a tender, movable nodule is often palpable just below the annular ligament which corresponds to the distal stump of the severed tendon. Electrical stimulation, for obvious reasons, is without visible effect on the special extensor movement which is lost. Although the muscle may respond, its contraction is not registered by an extension of the ungual phalanx, owing to the tendon separation. This fact is an important one, for if the paralysis were of neural origin, as is held by some writers, reactions of degeneration would be demonstrable. Another important diagnostic sign is the absence of the prominence of the extensor longus pollicis tendon, which normally forms the ulnar border of the 'snuff-box.' All the evidence tends to show that the usual seat of tendon rupture is just after its emergence from beneath the posterior annular ligament. This has been confirmed in a number of instances by operation, and the divided tendon found to be the seat of chronic inflammatory and degenerative changes.

In addition to drummers, isolated instances of its occurrence in other occupations have also been recorded, namely, in a type-setter, a wood-carver, a farmer, and in waiters. Of special interest are those traumatic cases in which rupture of the tendon has followed some weeks after fracture of the radius at the wrist, the tendon having suffered injury at the time of the accident, but rupture not taking place until after the fracture had healed and the function of the hand was restored. Ramsay Hunt¹ describes a typical case occurring in a tailor.

The reasons for excluding a neural origin of these extensor palsies of the thumb are: the acute onset of the paralysis and the associated

symptoms of tenosynovitis below the posterior annular ligament; evidences of rupture of the tendon, either by palpation of the nodular enlargement of the distal end or by actual demonstration at operation, and the total absence of electrical responses in the extensor longus pollicis, either normal or degenerative.

TREATMENT.—The indications are very clear. If the condition is seen immediately after rupture has occurred, an effort may be made to effect union by fixation of the thumb. In older cases, and when union does not take place promptly, the only chance of restoring function is by uniting the divided tendon by some method of suture. In some of the cases it has been impossible to bring the divided ends together because the distance separating them was so great. Under these circumstances the proximal end has been sutured to the tendon of the extensor carpi radialis or to the indicis extensor longus.

REFERENCE.—¹*Jour. Amer. Med. Assoc.* 1915, i, 1138.

DUODENAL ULCERS. (*See* GASTRIC AND DUODENAL ULCERS; STOMACH, ULCER OF.)

DUPUYTREN'S CONTRACTURE. *W. I. de C. Wheeler, F.R.C.S.I.*

Kenneth Black¹ draws a sharp distinction between Dupuytren's contracture, which, according to Robert Jones, is a "fibrositis of the palmar fascia not associated with any inflammatory thickening of the skin," and such conditions as miner's 'beat hand' and glass-blower's 'hook hand.' These latter are due to the formation of scar tissue, which contracts, and is not limited to the palmar fascia. The so-called congenital Dupuytren's contracture involving mostly the little finger, is really due to a shortening of the finger-joint capsules, and in part to a contraction of the skin and tendon sheaths. The true contracture is brought about: (1) By external agencies, i.e., palmar stresses; (2) By internal or constitutional factors.

In summing up the evidence as to causation, it is surmised that the principal cause of Dupuytren's contracture will eventually be recognized to be a certain internal condition (possibly akin to a gouty or rheumatic condition) among persons of advancing years.

TREATMENT.—*Non-operative.*—In the earlier stages of the disease, when there is the slightest tendency to contraction, the patient should wear, at night only, a well-padded splint on the affected finger, for the purpose of hyperextending it. Care must be taken to avoid giving pain, for pain would indicate that the extension was excessive, and more harm than good would be done. In combination with 'extension,' manipulations, massage, hot water, and Bier's treatment are useful. Fibrolysin injections have been tried, but the results cannot, on the whole, be regarded as encouraging. Ionic medication has also been tried. Leopold-Levi, who believes that Dupuytren's contracture is a symptom of thyroid deficiency, used internal treatment with thyroid extract in seven cases, with favourable results in five.

Operative.—When non-operative treatment fails, and in advanced cases of the disease, an operation is necessary. Apart from amputation (which, of course, must be reserved for exceptional cases of a very troublesome kind), there are two operations, known as the open and the subcutaneous respectively. In the open operation skin flaps are dissected from the palmar fascia; the palmar fascia is then excised and the wound is closed. The greatest care must be taken to keep the parts aseptic, for if the wound suppurates the operation will fail and the contraction will become excessive. The operation is by no means easy; it requires much patience; the dissecting back of the skin flaps from the adherent palmar fascia is troublesome, and the excision of the fascia from the sheaths of the flexor tendons must be done bit by bit. When this excision has been completed, the digits, in

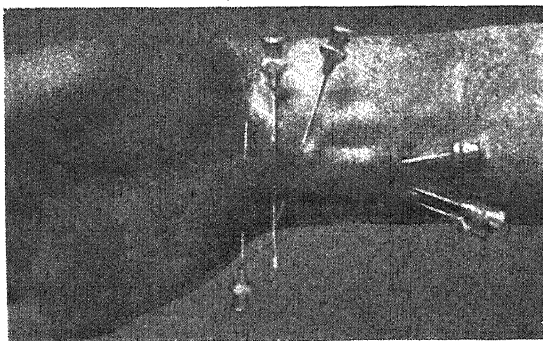


Fig. 20.—Dupuytren's contracture. Showing position of radium needles in fibrous scar.

(Kindly lent by Dr. Stevenson.)

favourable cases, will be found to be free and capable of being almost completely straightened. At this stage some surgeons rub fibrolysin into the open wound. The skin is then closed, and a well-padded splint is attached to keep the digits as straight as possible. The splint must be worn for some weeks uninterruptedly, and afterwards at night only, until the digits are straight and all tendency to contraction has been overcome. The subcutaneous operation gives excellent results if carefully carried out after the manner described by Adams. A very fine tenotomy knife is inserted between the skin and the tense bands of the palmar fascia, all of which, through as many punctures as may be necessary, are carefully divided. Generally, from six to ten punctures suffice, but in extensive cases as many as twenty may be necessary. A properly-devised finger splint is then applied and worn continuously until the digits are straight; afterwards the splint is worn at night only for several months. In the event of a relapse, which is uncommon, the operation can be repeated.

The treatment of Dupuytren's contracture might well include the

application of **Radium Emanations**. Stevenson² introduced needles containing capillary tubes (Dublin method) of emanation (average 5.5 millicuries) in scar tissue involving the flexor tendons of the wrist with an admirable result (Fig. 20).

REFERENCES.—¹*Brit. Med. Jour.* 1915, i, 326; ²*Ibid.* 1914, ii.

DYSENTERY, BACILLARY.

Sir Leonard Rogers, M.D., F.R.C.P.

ETIOLOGY.—Heffernan¹ has studied dysentery in the Madras Lunatic Asylum with the help of bacteriological examinations by M. Kesava Poi. The incidence of the disease was 9.5 per cent of the daily average number of patients resident, or 12.11 per cent of the total sick, while the case mortality was 19.8 per cent. This incidence is not greater than in some modern English asylums. In just half of 86 cases in which the stools were examined bacteriologically, dysentery bacilli were isolated. They could only be found in well-washed mucus from recently-passed stools. Acute cases with fever lasting about three days are almost certainly bacillary. Emetine had no influence except in cases showing *E. histolytica*. Three cases showing *Balantidium coli* proved rapidly fatal. Prophylactic inoculation with a vaccine made from both Shiga and Flexner bacilli obtained from asylum cases was not successful, and the same vaccine gave disappointing results in treatment. In 20.4 per cent of all post-mortems dysenteric lesions were found, but no case of liver abscess is recorded in the records for years past, confirming the conclusion that the disease is essentially bacillary in nature.

R. H. Norgate and I. W. Hall² report on an outbreak of dysentery in a workhouse near Bristol, due to the Y type of the Flexner dysentery bacillus, with 40 cases and 5 deaths. The organism agglutinated with a Y serum, but not with a Shiga or Flexner one.

M. K. Poi³ records his experience of bacteriological examinations of the stools in Heffernan's cases in the Madras Asylum, where he found both Shiga and Flexner bacilli. Carriers were difficult to detect, as the Widal test is of little help in dysentery.

TREATMENT.—Heffernan found saline treatment a failure, as the patients could not stand it. **Castor Oil** by the mouth and rectal lavage with **Boric Acid**, followed by **Albargin** 4 gr. to a pint, alternating with **Potassium Permanganate** solution twice daily and retained as long as possible, is now used by him. Serum treatment has been used with good results in fifteen cases, but is too expensive for general adoption. Sprue may ensue on the disease, and is very fatal. The prolonged isolation of carriers is the best prophylactic measure.

F. C. McCombie⁴ finds that 70 per cent of dysentery cases on tea gardens in Assam are not amœbic, and emetine has not reduced the mortality. Cases are often seen late, and the treatment is unsatisfactory. A slight experience of Forster's vaccine was not encouraging, but he thinks that further study might yield a more efficient vaccine.

REFERENCES.—¹*Ind. Med. Gaz.* 1914, 417; ²*Bristol Med.-Chir. Jour.* 1915, 44; ³*Ind. Jour. Med. Research*, 1915, 149; ⁴*Ind. Med. Gaz.* 1915, 11.

DYSMENORRHOEA.

Bryden Glendining, M.S., M.B., F.R.C.S.

TREATMENT.—Emil Novak¹ writes of the encouraging results he has obtained by means of **Atropine** in the treatment of the spasmodic variety of dysmenorrhœa. The administration is commenced two days before the anticipated onset of a period, and continued until the second or third day of the period according to the usual duration of the pain. There is considerable difference in the degree of toleration to the drug, but ordinarily gr. $\frac{1}{100}$ is given alone in tablet form three times daily; should the pain persist and no symptoms of atropine saturation be present, the doses may be repeated more frequently. Many patients complain of dryness of the throat, itching of the skin, and also of disturbed accommodation, and these should serve as an indication for lessening the dose. His experience has included some strikingly successful cases, but also some failures.

Spitzig,² writing on the treatment of functional dysmenorrhœas, attributes their origin to a congestive condition induced by the erect posture, costal respiration, and tight lacing. He gives **Sodium Citrate** gr. 20 three times daily during two weeks preceding the period, and also pays attention to the general body hygiene. The alkaline citrate neutralizes the carbonic acid and other waste products, and increases oxidation, and is thus the most efficient way of preventing cellular œdema and of diminishing the viscosity.

Waller³ thinks that the profession ought to recognize the relief obtained by both **Alcohol** and **Morphia** in these conditions, and should prescribe them suitably masked, so that the patient is unconscious of the nature of the remedy employed, and therefore unlikely to drop into habits of self-medication, when the danger of inveterate intoxication becomes so real.

After these two drugs, the next in order of success are **Phenacetin** among the coal-tar compounds (15 gr. at least, repeated as necessary), and **Bromides**. These, however, tend to depress the excretory function which it is often desired to augment in dysmenorrhœa. Of the organic extracts, the most useful is the **Thyroid Extract** 10 to 15 gr. daily for eight days before the period. **Belladonna** is most efficacious when used as a suppository.

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1915, i, 120; ²*Ibid.* 733; ³*Med. Press and Circ.* 1914, ii, 304.

DYSPEPSIA (Test Meals). (*See also GASTRIC ANALYSIS.*)

Robert Hutchison, M.D., F.R.C.P.

Smithies,¹ on the basis of an examination of more than 7000 cases, deals with the question of the diagnostic and prognostic indications furnished by test meals. The emptying power of the stomach was estimated by an ordinary mixed meal after an interval of twelve hours; the secretory functions by the usual Ewald breakfast. The size and position of the stomach were determined by inflation in the recumbent position.

Size of Stomach.—The average capacity of the stomach was 27 oz. in females and 33 oz. in males. In cases of dilatation the average

female capacity was 41 oz., and the average male 52 oz. The greatest capacity was found in cases of benign pyloric stenosis.

Colour.—The appearance of traumatic blood upon lavage had no constant relation to any form of gastric disease other than cancer, in more than half the cases in which it was observed. Brownish extracts were noted in only 19 per cent of cancer cases, and were just as common in non-malignant dilatation. Bile may be present in many conditions. If definitely green it indicates that the bile has been present in the stomach for some hours and has undergone oxidation.

Odour.—An acrid, rancid odour due to volatile organic acids is characteristic of cancer; a yeasty smell points to benign stenosis.

Amount of Extract.—The average quantity of test meal removed in non-retention cases was 76 c.c.; in cases of stenosis, 350 c.c. So-called 'hypersecretion' was as frequently observed in pyloric spasm from appendix or gall-bladder disease as from duodenal or gastric ulcer. Mucus is a sign of little diagnostic value.

Delayed Emptying Power.—This has no necessary relation to the activity of peristalsis. In many cases of 'hyperperistalsis' the rate of emptying is delayed from pyloric stenosis. In gastric cancer, emptying was delayed in 70 per cent of the cases irrespective of the site of the growth. In about two-thirds of the cases of surgical duodenal ulcer, and one half the cases of surgical gastric ulcer, some degree of retention was present. Of the pyloric spasms associated with appendicitis, gall-stones, etc., in rather more than 3 per cent retention was demonstrated. The characteristic sign in these cases is the variability of the retention at different examinations.

Gastric Acidity.—The highest acidities are found in acute gastric ulcer and in pyloric spasm associated with duodenal ulcer, appendicitis, and cholecystitis. In only 54 per cent of the cases of carcinoma was free hydrochloric acid absent. In gastric ulcer with retention there is an increase both in free hydrochloric acid and in total acidity; in cancer, as retention comes on, free hydrochloric acid is progressively lowered, while total acidity simultaneously increases.

Occult blood was demonstrated in the gastric extract in 75 per cent of the cases of cancer. Apart from this it is of little diagnostic value.

In 92 per cent of the cases where *lactic acid* was found, an extensive growth, generally inoperable, was present. In only 7 per cent of the non-malignant retention cases was lactic acid present.

Micro-organisms.—In regard to these there are four pictures which are almost pathognomonic of different types of disease:—

1. Benign gastric retention (usually ulcer). In 89 per cent of cases of this type the presence of large numbers of actively budding yeasts, associated with large and small sarcinae and bacilli, apparently of the colon group, and food bits were demonstrated. The gastric acidity was generally above 50.

2. Gastric cancer. In 93.8 per cent of all proved, late, malignant cases, organisms of the Boas-Oppler group, associated with food

retention and acid averaging below 10, were a characteristic picture. In but 30 per cent of instances were budding yeasts concomitant. In but 10 per cent were sarcinae associated. Threads of streptococci were found in 6.2 per cent (more commonly in the non-retention group). There is no characteristic microscopic picture of early gastric cancer other than that associated with gastric ulcer of the retention type. In less than 1 per cent of cases of gastric cancer were so-called 'cancer cells' with active mitoses seen. These were all late cases or cases where the cardiac orifice was involved with a sloughing growth.

3. Achylia gastrica, primary or secondary. In gastric extracts of low or absent hydrochloric acid, when there is atrophy of the mucosa and where motility is not interfered with, there are found long chains of streptococci (resembling beads of a rosary); groups of large, deep-staining cocci, and a peculiar, short, fat, acid-fast rod or cocco-bacillus that grows in short chains or pairs, or alone.

4. When perforation into an adjacent viscus has taken place in malignant ulcer or primary cancer, or where obstruction has occurred below the duodenum, the picture of immense numbers of thick cocco-bacilli, with or without spirillae or streptococci, in association with low acidity, retarded food progress and putrefaction, as evidenced by the odour, is shown in more than 94 per cent of instances.

(See also Vol. 1915, p. 286.)

REFERENCE.—¹*Amer. Jour. Med. Sci.* 1915, i, 183.

DYSPEPSIA IN CHILDHOOD. *Frederick Langmead, M.D., F.R.C.P.*

Charles McNeill¹ points out that children suffering from dyspepsia, in one or other of its clinical types, form an easy majority of the cases attending an out-patient department. They show many symptoms of disturbed health. Some of these stand out in the foreground of the clinical picture, others are less conspicuous. Symptoms which are prominent in one child may be subordinate in another. Among those which are seldom absent are slowness of growth and thinness; a morbid appetite, either refusal of food or greediness; disturbed sleep, in many degrees; muscular asthenia, shown by tiredness and refusal to play; vasomotor depression, shown by coldness of hands and feet and by unusual susceptibility to cold, and no doubt by fainting attacks; and instability of the nervous system, shown by timidity, shyness, and irritability. Cough is another common symptom, as also is thirst, though it is seldom mentioned in text-books. Worms are frequently associated, though whether as a cause or as a consequence it is difficult to decide.

The same writer bases certain conclusions as to treatment on the notes of 120 cases observed in the out-patient department of a children's hospital during the last three years. He considers that emulsions of **Liquid Paraffin** or **Castor Oil** (in small, non-purgative doses) are of great value in various and apparently distinct forms of the condition. The varieties with which he deals are: (1) Malnutrition, frequently accompanied by chronic diarrhoea, seldom by

PLATE XIV.

TUBERCULOUS DISEASE OF THE EAR

These Plates are kindly lent by the *Royal Society of Medicine*

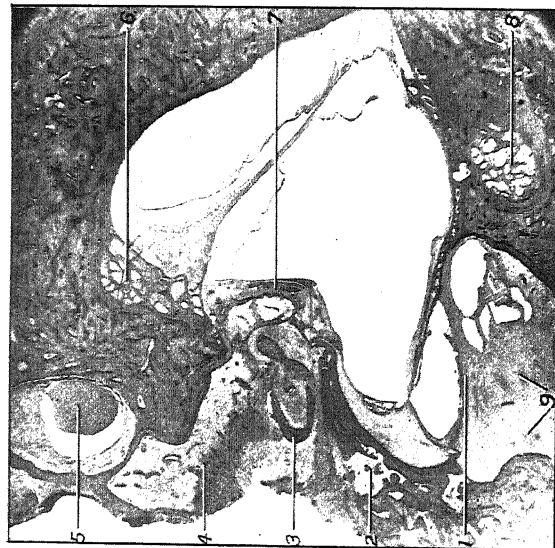


Fig. A.—Early tuberculous disease of the ear. Showing invasion of vestibule through oval window; erosion of promontory; niche of round window filled with tuberculous granulation tissue. 1, Membrane of round window; 2, Tuberculous erosion of promontory; 3, Head of stapes; 4, Tuberculous tissue in niche of oval window; 5, Facial nerve; 6, Vestibular nerve to utricle, external and superior canals; 7, Footplate of stapes, eroded and displaced towards vestibule; 8, Vestibular nerve to ampulla of posterior canal; 9, Tuberculous tissue filling up niche of round window.

MEBICAL ANNAL, 1916

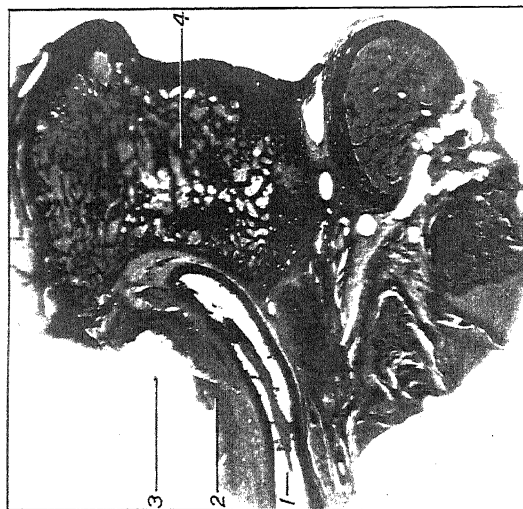


Fig. B.—Advanced tuberculous disease of the ear. Vertical transverse section through anterior part of petrous pyramid. Internal carotid artery; 2, Tuberculous granulation tissue infiltrating the petrous pyramid; 3, Niche of Eustachian tube; the tube can no longer be recognized; 4, Anterior part of petrous pyramid.

Dr. John S. Fraser

PLATE XI.

TUBERCULOUS DISEASE OF THE EAR. *Continued*

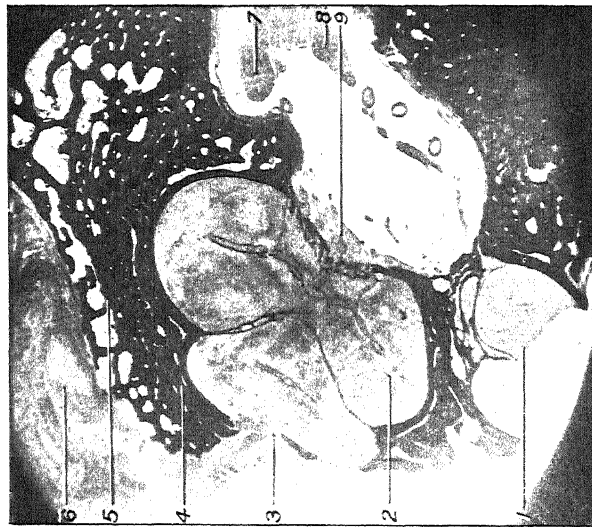


Fig. C.—Advanced tuberculous disease of the ear. Vertical transverse section through cochlea, showing fistula into cochlea; cochlea is full of tuberculous granulation tissue. 1, Fistula into basal coil of cochlea; 2, Middle coil of cochlea; all seeds are filled with tuberculous granulation tissue; the ossicles spiral lamina is still to be seen; 3, Fistula into apex of cochlea; 4, Tuberculous lymphangitis in floor of middle meatus; 5, Facial nerve; 6, Tuberculous lymphangitis in floor of middle meatus; 7, Auditory nerve; 8, Auditory nerve; 9, Cellular infiltration in fundus of internal meatus.

McNICOLL. ANNUL. 1916

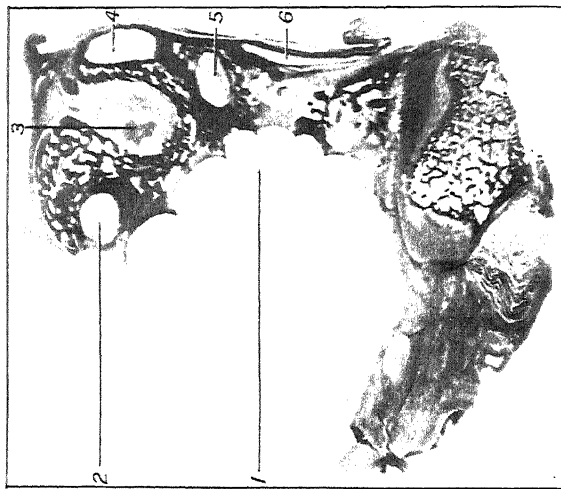


Fig. D.—Advanced tuberculous disease of the ear. Vertical section through posterior part of petrous bone. The outer wall of the vestibule has been destroyed by the disease. 1, Large gap in wall of labyrinth; the ampullary end of the posterior canal, both parts of the external canal and the facial nerve, are absent; 2, Ampullary end of superior canal; 3, Tuberculous infiltration in fossa subarcuata; 4, Smooth end of superior canal; 5, Smooth end of posterior canal; 6, Secretory endolymphatic; the tuberculous infiltration reaches to the outer wall of the sacculus.

Dr. John S. Fraser

PLATE XVI

TUBERCULOUS DISEASE OF THE EAR: *Continued*



Fig. E.—I. C., age 9 months. Fibro-ossifying type of tuberculous otitis. Vertical section of left inner ear. 1, Cochlear nerve in internal meatus infiltrated by tubercle; 2, Small-cell infiltration in fundus of internal meatus; 3, Dilatation of cochlear canal in middle coil; 4, New formation of fibrous tissue and bone in scala vestibuli of middle coil; 5, Lamellar bone surrounding cochlear capsule; 6, Cartilage bone capsule of cochlea; 7, Facial nerve; 8, Apical coil of cochlea; 9, Tuberculous erosion (isthmus) into basal coil; 10, Basal coil filled by granulation tissue and new bone; 11, Niche of round window filled with tuberculous granulation tissue.

PLATE XVII

TUBERCULOUS DISEASE OF THE EAR—Continued

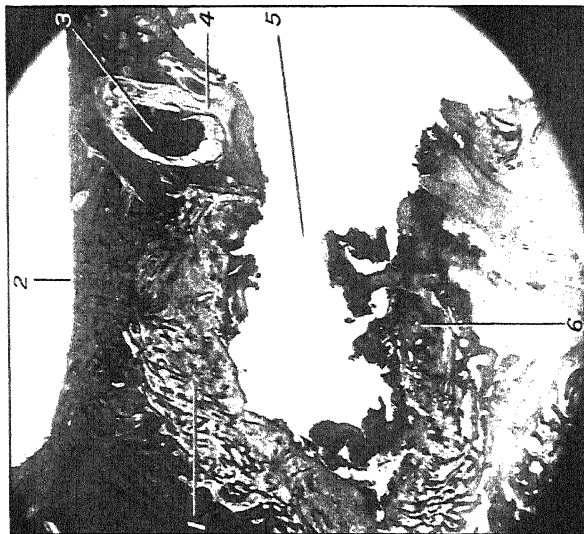


Fig. 5.—Fibro-ossifying type of tuberculous otitis. Vertical section of left inner ear. 1, New connective tissue and bone in wall of vestibule; 2, Middle cranial fossa; 3, Facial nerve; 4, Dehiscence in facial canal; 5, Large fistula into vestibule in region of oval window—the promontory has disappeared; 6, Tuberculous sequestrum in lower part of vestibule.

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Fig. 6.—Tuberculous disease of adenoid post-nasal growths. 1, Stratified squamous epithelium on surface of adenoid growths replacing the normal stratified ciliated columnar epithelium; 2, Giant cells in subepithelial lymphoid tissue.]

Dr. John S. Fraser

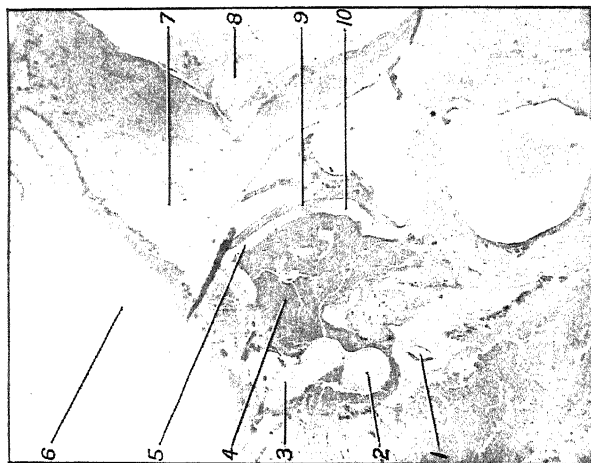


Fig. II.—*Günther-pig*—Tuberculous disease of the ear (experimental). Horizontal section through right ear, showing perforation of footplate of stapes by pus, and invasion of perilymph space of vestibule. 1, External canal; 2, Lucas; 3, Malleus; 4, Incus; 5, Tympanic cavity; 6, Capsule of cochlea; 7, Nerve in internal meatus; 8, Perforation of cochlear capsule by pus which is invading the perilymph space of the vestibule; 9, Perforation of cochlear capsule by pus which is invading the perilymph space of the vestibule; 10, Posterior part of stapes footplate.

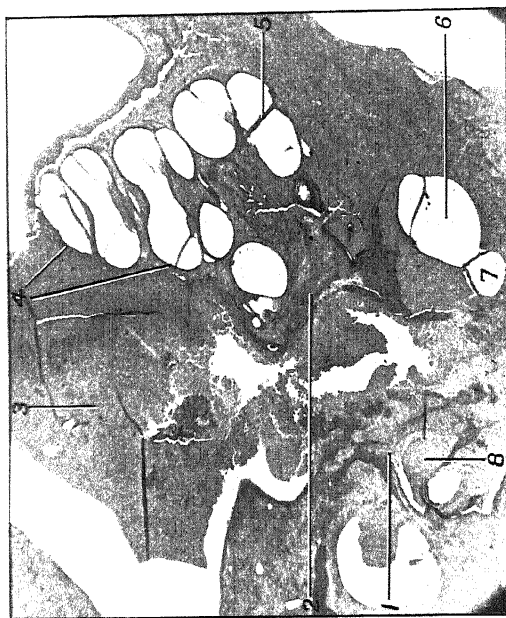


Fig. I.—*Günther-pig*—Tuberculous disease of the ear (experimental). Horizontal section through right ear, showing horizontal section of cochlea. 1, Horizontal section of cochlea; 2, Infiltration of round window membrane; 3, Infundibular cavity (rudimentary); 4, Erosion of outer body wall of cochlea; 5, New amplexory tissue in scala tympani of basal cochlear coil; 6 and 7, Ampullary end of posterior canal opening into vestibule; 8, Ampullary end of posterior canal opening into vestibule.

constipation ; (2) Enuresis, with dyspeptic symptoms ; (3) Recurrent vomiting (cyclical or bilious vomiting) ; (4) Recurrent attacks of fainting or sudden pallor ; (5) Urticaria or eczema, with dyspeptic symptoms. In a great majority of these diverse forms of illness there is an abnormal condition of the stools ; this may be a true diarrhœa, but not seldom is a too soft consistence of the stool, with or without mucus. Constipation was present in only a small number. In many cases the condition had followed one of the common fevers of childhood, especially measles and whooping-cough. The post-infection cases appeared to be particularly amenable to this form of treatment. In a series of 13 cases of enuresis, 8 were cured and 3 greatly benefited. Used as he recommends, the action of liquid paraffin and of castor oil is the same. It is entirely local, being confined to the mucous membrane of the alimentary tract, and is probably a sedative one. He advises paraffin in 30-min. doses, or castor oil in 15-min. doses, each thrice daily.

REFERENCE.—¹*Edin. Med. Jour.* 1915, i, 100.

EAR, DISEASES OF. (See AUDITORY NERVE ; DEAFNESS ; EAR, TUBERCULOSIS OF ; OTITIS MEDIA ; OTOSCLEROSIS.)

EAR, TUBERCULOSIS OF.

J. S. Fraser, M.B., F.R.C.S.

Turner and Fraser¹ contribute a paper on this subject. The plates illustrating this condition (XIV to XVIII) have all been kindly supplied by the *Royal College of Medicine*.

CLASSIFICATION AND ETIOLOGY.—Cases of tuberculous otitis media may be divided into two groups—(1) In *infants and very young children* who are fed, in whole or in part, on unsterilized cow's milk which contains the bovine type of tubercle bacillus. This view of the etiology of tuberculous otitis media is supported by the frequency of this condition in infants and young children as compared with the ordinary purulent forms. If we take otitis media at all ages, we find that tuberculosis accounts for only 2·8 per cent of the cases ; but if we consider only cases of otitis media under two years of age, we find that it accounts for 27 per cent, and that, under one year, half the cases (50 per cent) are due to tuberculosis. The work of John Fraser on tubercle of bone, and of Philp Mitchell on tuberculosis of glands and on tuberculous infection of the Edinburgh milk supply, strongly support this view of the etiology of tuberculous otitis media in infants. (2) In the *advanced stages of phthisis pulmonalis* we meet with tuberculous disease of the middle-ear cleft. Statistics as to the frequency of tuberculous otitis media in consumptives vary very greatly. StClair Thomson only found two cases of tuberculous otitis among 700 patients suffering from pulmonary tuberculosis. Herzog, on the other hand, found chronic purulent otitis media in 17 out of 100 cases of consumption. De Rossi found 26 cases of otitis media among 280 cases of phthisis pulmonalis. Turner and Fraser have examined 5 cases of chronic purulent otitis media

occurring among 120 cases of pulmonary phthisis—mostly in the advanced stages—at the Edinburgh Fever Hospital. In only one of these was there any suspicion of tuberculous otitis media.

The *route of infection* in tuberculous otitis media is still a matter of dispute. It is generally agreed, however, that there are two possible routes—(1) By way of the Eustachian tube; and (2) By the blood-stream.

1. *Infection via the Tube*.—This may be produced (a) By tuberculous infiltration of the mucous membrane spreading up the tube to the tympanic cavity; ulceration of the surface is usually present. This mode of infection is probably the usual one in infants, and is frequently associated with tuberculosis of the mucosa of the nasopharynx, including the adenoid post-nasal growths. (b) By insufflation of infectious particles up the Eustachian tube during the acts of coughing, sneezing, or vomiting. The latter is the usual route and mode of infection in advanced cases of phthisis pulmonalis, and may be predisposed to in consumptives by the absorption of the fatty tissue in the walls of the Eustachian tube, rendering the tubes more patent than normal. Infection of the middle-ear cleft by the insufflation of infective particles is also quite probable in infants fed on unsterilized cow's milk, as the Eustachian tubes at this age are wide and straight, and vomiting is of frequent occurrence.

2. *Infection by the Blood-stream*.—It is not easy to be sure that the middle ear has been infected by this route, but if the Eustachian tube and tympanum appear to be healthy, while the mastoid process alone is diseased, the probability is that the infection has occurred by way of the blood-stream. Definite proof can only be obtained by post-mortem investigation.

SYMPTOMS.—The onset of tuberculous otitis appears to be painless in 92 per cent of the cases; this is in marked contrast to the early stages of simple purulent otitis media. The lymph-glands surrounding the ear are enlarged in 95 per cent of the cases. In the early stage the discharge is watery, and later may be flocculent; in the advanced stages, where mixed infection is present, it is offensive and purulent. More or less marked paralysis of the facial nerve was present in 45 per cent of the cases recorded by Turner. The protection which the facial nerve enjoys in ordinary cases of suppurative otitis media on account of its special blood-supply does not hold good against tuberculous invasion. Multiple perforations in the tympanic membrane may often be seen in adults in cases of tuberculous otitis associated with phthisis pulmonalis. In infants, however, the sagging of the posterior superior meatal wall usually prevents inspection of the drumhead. If mixed infection occur in a case of tuberculous otitis, the symptoms of an acute otitis media and mastoiditis may arise and may confuse the diagnosis.

The involvement of the *labyrinth* in cases of tuberculous otitis media is of frequent occurrence, and takes place at a comparatively early stage of the disease. The percentage of cases of labyrinthitis varies

from 23 (Kuemmel) to 33 per cent (Siebenmann). Turner's statistics show that labyrinth necrosis was present in 22 per cent of the cases operated on, while in another 31 per cent there was erosion of the labyrinth wall, thus giving a total of 53 per cent. In infants and very young children the ordinary tests of the labyrinth function can hardly be applied (tuning-fork tests, rotation, etc.); but after the radical mastoid operation has been completed, the vestibular function may be tested by the application of cold lotion to the inner wall of the middle ear. If the vestibular apparatus be functional this produces a conjugate deviation of the eyes to the lower or non-operated side; if the vestibular apparatus be destroyed by disease, no such deviation occurs. Tuberculous labyrinthitis—like tuberculous otitis media—appears to have a quiet onset. This is in marked contrast to the violent symptoms produced by an attack of acute purulent 'manifest' labyrinthitis.

COMPLICATIONS.—The majority of writers hold that tuberculous otitis media and interna do not, as a rule, give rise to intracranial complications, though tuberculous pachymeningitis externa is frequently met with. On the other hand, Macewen and Koerner appear to hold the view that tuberculous meningitis, tuberculous tumour (or abscess) of the brain, and tuberculous affection of the sigmoid sinus not infrequently result from tuberculous otitis media. Garelo has demonstrated a tuberculoma of the inner ear and posterior cranial fossæ. Cases are on record of hæmorrhage from the internal carotid artery as the result of tuberculous erosion of the Eustachian tube extending to the coats of this vessel. Brieger states that purulent leptomeningitis may be due to a tuberculous otitis which has become the seat of secondary infection.

DIAGNOSIS.—This is made by attention to the following points: (1) The clinical characteristics of the case. (2) Examination of the ear discharge for tubercle bacilli by staining films with carbolfuchsin in the usual way and then decolorizing with sulphuric acid in alcohol. This method eliminates those organisms which are acid-fast but not *acid- and alcohol-fast*, as is the tubercle bacillus. (3) The findings at operation—enlarged caseous glands, presence of necrosed bone, pale flabby granulations, putty-like pus in the antrum, extensive caries of the bone, tuberculous granulations on the dura mater, necrosis of the labyrinthine wall, or labyrinth fistula. (4) Microscopic examination of the granulations, or rather of the swollen and infiltrated mucosa removed at operation. (5) Subcutaneous inoculation of the tissue obtained at operation into the groin of a guinea-pig. In order to get rid of mixed infection, this tissue may be previously treated with antiformin or ericolin. In order to determine whether the ear condition is due to the presence of the bovine or of the human type of tubercle bacillus, it is necessary to make cultures on egg medium from the tuberculous lesions in the guinea-pig, and then to inoculate rabbits (John Fraser, *Tuberculosis of the Bones and Joints in Children*, London, 1914).

PROGNOSIS.—This is not favourable, though numerous cures are reported.

From what has already been said, it is obvious that great attention should be paid to obtaining a pure milk supply.

TREATMENT.—Brieger holds that the indications for treatment are the same as those in the ordinary purulent forms of otitis media and mastoiditis. Blegvad says that we should operate at once, whenever the tuberculous nature of the disease is recognized. Ruttin, on the other hand, holds the opinion that operation is indicated in cases associated with phthisis pulmonalis only if the patient is suffering severe pain, as it is hopeless to get rid of all the disease, and E. Urbantschitsch believes that operation may result in a tuberculous meningitis or in lighting up a general tuberculosis. Probably the correct position lies between these two. Operation should be performed if the patient is in good condition, but should be omitted if advanced phthisis pulmonalis, tuberculous meningitis, or general tuberculosis be present. Even in cases of advanced consumption, however, an operation should be performed if severe pain in the ear be present.

If the infection, as is generally admitted, comes by way of the Eustachian tube, and involves the tympanic cavity as well as the mastoid antrum, it is useless to perform the Schwartze operation, which only deals with the mastoid process. The radical operation is therefore indicated in all cases except those rare fungoid forms in which there is an apparently primary (hæmatogenous) involvement of the mastoid process. When the radical operation is performed, it is an advantage to expose the dura mater of the middle and posterior fossa over a considerable area, as this membrane forms a much better barrier than the bone against the spread of tuberculous disease. (Adenoids, if present, should not be removed at the time of the mastoid operation, but may be dealt with a week later.) Even the most extensive operation does not remove the last vestige of disease, e.g., in the middle of the Eustachian tube. One must therefore depend to a great extent on the resisting powers of the patient, and for this reason it is very important that sanatoria should be provided for the after-treatment of these ear cases among other forms of 'surgical' tuberculosis. It is useless to send the children back to the slums from which so many of them come. Some writers emphasize the good effect of exposing patients, after operation, to the rays of the sun, while others claim that they have used **Radium** with success in tuberculous ulceration of the external meatus, though admitting that it is useless in otitis media. Muck advocates the use of suction in the treatment of tuberculous otitis media. He employs a cupping-glass or Bier's method. The negative pressure should be slight at first, and should be slowly increased. Muck notes that patients feel very tired during these suction séances, and admits that the 'cure' is very protracted. The abstractor believes that he has seen benefit result from the application of Pfannenstiel's method of treating tuber-

culosis of the nasal mucous membrane. **Sodium Iodide** is given internally in increasing doses, and the operation cavity is packed each day with strips of gauze soaked in **Peroxide of Hydrogen** or **Eusol**.

REFERENCE.—¹*Proc. Roy. Soc. Med., Otol. Sect.*, 1915, viii, 17.

EAR, WAR INJURIES OF. (See also DEAFNESS.)

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Pinna.—West¹ states that, considering its exposed position, the pinna appears to suffer very rarely. If the external meatus be not injured, the damage is only æsthetic. As the blood-supply is abundant, there is good hope of the survival of an almost completely separated ear. Sutures should not penetrate the perichondrium, but should be through skin only.

External Auditory Meatus.—Wounds of the cartilaginous part are direct, and there is apt to be serious cicatricial contraction of the lumen in healing. This latter condition is best treated by a planned plastic operation after all is soundly healed. Direct wounds of the bony part of the meatus are usually at once fatal, unless the bullet be a spent one, when it may lodge in the petrous bone. Such wounds are always serious, but especially so when they are complicated by antecedent middle-ear suppuration. In such cases the radical mastoid operation should be performed. Fractures of the roof of the external meatus, which may occur as a part of an extensive fracture of the skull, are usually compound, because the lining cuticle of the meatus is torn. The treatment consists in carefully drying the external meatus, filling it with boric powder, and closing it by means of a dry dressing. The ear should never be syringed.

Drumhead and Tympanic Structures.—Rupture of the membranë is a fairly common war injury, generally resulting from the explosion of heavy shell close to the sufferer. The tears are much less regular in shape and position than those familiar in civil life. They are often extensive, and may give the impression of actual loss of substance. The symptoms are: slight bleeding from the ear, followed by a serous discharge; there is deafness, and frequently some vertigo and pulsating tinnitus. In extreme cases the joint between the malleus and incus may be dislocated. The treatment is the same as that mentioned above for fractures of the meatus. The prognosis for hearing is generally good.

Direct wounds of the walls of the tympanum involve the labyrinth, the internal auditory meatus, or the pons. Below, they may reach the jugular bulb and, posteriorly, the facial nerve, the mastoid, and the sigmoid sinus; anteriorly, the internal carotid artery may be injured. If the patient survives the immediate injury, the only urgent need is the control of hæmorrhage. When this is venous it is easily managed, and later the wound can be carefully plugged with gauze, which should not be disturbed for forty-eight hours. If, on the other hand, the bleeding comes from the internal carotid, the

only chance for the patient's life lies in control of the artery in the neck until it can be ligatured.

Mastoid.—Almost all wounds of the mastoid extend beyond it to the cranium or neck. If infection has taken place, the whole of the mastoid cells should be opened up and freely drained.

War Deafness.—Lermoyez² states that there are four types: (1) Direct traumatic; (2) Indirect traumatic; (3) Functional; (4) Psychical; but he only deals with the two former. (For the latter see article by Milligan and Westmacott, below.)

1. *Direct Traumatic Deafness* may be due to (a) penetration of projectiles into the auricle or temporal bone. Lesions vary from a slight surface injury to sudden death caused by a bullet which traverses the petrous bone in a transverse direction. In the severely wounded cases which survive, the deafness is only noted when the bandages are removed. Lermoyez says that all are agreed that the bullet should be removed if it can be seen; but if not, some surgeons hold that it is better to wait, while others believe that an immediate exploratory operation should be carried out for fear of infectious intracranial complications. Lermoyez holds that it is better to wait if the wound be recent and aseptic, but to operate at once if otorrhœa be present. Further, if facial paralysis, labyrinthine disturbance, or meningitis be found, one should operate at once. Direct traumatic deafness may also be due to (b) blows on the skull from a rifle butt or sabre, or by falls on the head. Deafness may be produced in this way with or without fracture of the petrous bone.

In cases with *fracture of the petrous bone* the line of fracture may be transverse or longitudinal. In the former case the blow is from behind on the occipital bone, and the line of fracture is perpendicular to the long axis of the petrous from the posterior to the anterior foramen lacerum. The internal ear is opened, but not the middle ear. The nervous mechanism of hearing is destroyed by hæmorrhage, and the auditory and facial nerves may be torn. If cure occurs, the labyrinth becomes blocked up by callus. The usual signs of fracture of the base are present, but there is, in addition, slight hæmorrhage from the external auditory meatus, along with a flow of cerebrospinal fluid. Facial paralysis is common. When the patient recovers consciousness, he notices complete deafness on one or both sides, tinnitus, vertigo, and nausea. If he tries to get up, he staggers and falls. The disturbances of equilibrium soon pass off, but the deafness and noises remain. The treatment is that of fracture of the base. Leeches may be applied over the mastoid, and if the vertigo be intense, lumbar puncture may be called for.

Longitudinal fractures of the petrous bone are due to blows or falls on the side of the head, the line of fracture being parallel to the axis of the petrous bone. In this case, the labyrinth is not opened, but the middle ear is fractured along the roof of the cleft, and the tympanic membrane is torn. The hæmorrhage from the ear is very copious and lasts several days, but there is no flow of cerebrospinal

fluid. Deafness is well marked, but there is no giddiness or facial paralysis. If suppuration occurs, there is considerable danger to life, as the infection may extend to the intracranial structures. If, however, the suppuration is confined to the tympanic cavity, the resulting deafness is only of moderate degree, being due to adhesive processes in the middle ear; while if the ear does not suppurate there is little or no deafness. Treatment consists in plugging the external auditory meatus with a wick of iodoform gauze, to stop the bleeding. Later, the external meatus should be cleansed with sterile mops of dry cotton-wool, and the ear covered with a thick pad of sterile wool and bandaged. All syringing and wet dressing should be avoided.

Traumatic deafness *without fracture of the petrous bone* constitutes the so-called labyrinthine concussion, and is well known in medico-legal cases following accidents to workmen. As these cases are not fatal, their exact pathology (if any) is not known; but it is supposed that the membranous labyrinth is injured and that hæmorrhage takes place which destroys Corti's organ and the ampullæ of the semi-circular canals, or that the auditory and vestibular nerves are torn. After the blow or fall on the head, the patient becomes semi-unconscious, and may continue so for several hours. There is no epistaxis or discharge of blood or fluid from the ear. When he regains consciousness he feels intoxicated and has to lie down, and discovers that he is deaf in one ear. The prognosis in regard to recovery of hearing is bad, but disturbances of balancing pass off. Lermoyez holds that if at the end of some months the patient still complains of vertigo, he is probably malingering. Treatment is of no avail. If cases diagnosed as labyrinthine concussion are cured, they have probably all along been instances of psychological deafness.

2. *Indirect Traumatic Deafness* (shell deafness or explosion deafness) is, according to Lermoyez, the true war deafness. A shell bursts, and, though no projectile has wounded the petrous bone and no blow has injured the skull, the ear dies. It is not due to the noise, but to the sudden displacement of air, which strikes against the tympanic membrane and causes the injury. The bursting of a shell can affect the ear in two different ways: (a) The intense noise puts the auditory apparatus into an exaggerated state of vibration, and temporarily paralyzes it. A sudden light injures the retina in a similar way. A functional deafness is produced, but it disappears in a few days. An explosion causes the air to be violently projected into the external auditory meatus, just as earth might be shot up. The condensed air presses on the tympanic membrane, which transmits the pressure to the labyrinth. (The membrane and ossicles transform vibrations of the drumhead, which are of great amplitude but slight force, into movements of the stapes, which are of small amplitude but of great force, in order to overcome the inertia of the fluid in the labyrinth). This sudden condensation of air is comparable with, though enormously greater than, the effect produced by a smack on the ear, and is especially the result of explosions in an enclosed space. This type

of deafness is frequently observed after the bursting of bombs in the trenches rather than in the open field. The result of the explosion varies according to whether the tympanic membrane resists or gives way.

If the drumhead resists, the force of the explosion is transmitted thirtyfold by the stapes to the perilymph, producing labyrinthine concussion such as we find after violent injuries of the skull. The auditory and static labyrinths are both involved, and the patient, on regaining consciousness, suffers from deafness, tinnitus, and vertigo. The prognosis depends on the degree of violence and proximity of the explosion, and on the formation and condition of the external meatus, e.g., a narrow curved meatus containing a plug of wax would protect the ear to a great extent. Further, if the soldier expects the explosion, being warned of the arrival of the shell by the increasing whizzing of the sound, he prepares himself for the noise—opens his mouth and unconsciously tightens his tympanic membrane.

From the clinical point of view, Lermoyez distinguishes two degrees of labyrinthine concussion. In a mild case, taken unawares by the explosion, the subject feels stunned at first; when his astonishment has passed, he feels in one or both ears an uncomfortable sensation of fullness; it seems to him as if there is at the bottom of the meatus a plug of thick cotton-wool which veils sounds, and which he tries to get rid of by manipulating his auditory meatus with his finger; at the same time he perceives a musical noise, like a swarm of mosquitoes, which at first he erroneously thinks comes from outside, but which eventually he localizes as being in his ear. Often he notices that his gait is uncertain; when he turns his head, a feeling of giddiness just fails to make him fall down. There is no discharge from the ear, no pain, no lesion visible by the aural speculum. This condition lasts several days, sometimes several weeks; the giddiness disappears first; then the hearing returns, but the musical tinnitus may persist indefinitely. Local treatment is useless; but the patient must be kept absolutely quiet and in silence as long as the ear shows signs of hyperæsthesia. Bromides should be given. These 'slightly wounded soldiers' can return to duty after about a month, but the susceptible ear must be carefully plugged.

In 'severe labyrinthine concussion,' a mine explodes and the man falls unconscious. Coming to himself, he tries to get up but falls again. He has to be assisted to his feet and held up, as he feels drunk or stupefied. Everything about him seems to turn, and he suffers from nausea and vomiting. For several days the patient remains silent and nervous. The slightest movement of his head, or even the sight of anything moving, brings on vertigo, cold sweats, nausea, and epigastric pain. No food is tolerated. At the end of a week the vertigo is less and the patient can sit up or even get up, though he has to walk holding on to objects for support. He is now chiefly concerned about his deafness, which is usually unilateral, but so severe that he cannot hear a shout in the affected ear, though

his head seems full of the noise of whistling and bells. On examination, hæmorrhagic spots may be seen on the tympanic membrane, suggesting that hæmorrhages have also occurred in the internal ear, while functional examination reveals a pure nerve deafness. The vertigo disappears in from three to six months at most, though sudden turning movements, or looking down from a height, still cause great disturbance of equilibrium. The tinnitus decreases but does not disappear, and the deafness persists. Sometimes there are merely gaps in the scale of hearing, e.g., high tones, such as the whistling of birds, are no longer heard. The prognosis should always be guarded, as the deafness, which at first is partial, may later become complete. Lermoyez holds that men wounded in this manner are unfit for any form of active service. As one ear is completely deaf they cannot locate a sound. Immediately after the injury, the patient should be removed on a stretcher with great care, and put to bed in a cool, silent, and dark place. The patient himself chooses the position (supine, prone, or on his side) in which the vertigo and nystagmus are least marked.

The treatment is the same as that after a long administration of chloroform, which itself causes intoxication of the labyrinth. To relieve the thirst, a few teaspoonfuls of iced water may be given, but as seldom as possible. A mustard plaster or a hot compress should be applied over the epigastrium to relieve the nausea, while an ice-bag, guarded by a layer of flannel, may be placed over the ear. If the patient complains of buzzing, two **Leeches** may be applied behind the ear. A hypodermic of **Morphia** may be given, and repeated morning and evening for two or three days. Thereafter, **Bromide of Potassium** should be prescribed. In the treatment of deafness, Lermoyez recommends large doses of **Strychnine** hypodermically (2 mgrms three times a day for a fortnight, not longer). Electricity is of no use. Later on, an artificial aid to hearing may be tried, but **Lip-reading** is likely to be of much greater service.

If the drumhead gives way before the force of the explosion, the effects are much less severe. Rupture of a normal tympanic membrane is rare, but if it occurs, the force of the explosion is almost entirely absorbed, so that only slight labyrinth concussion results. On the other hand, rupture of a diseased tympanic membrane is a frequent occurrence. In such cases, also, there is usually some degree of ankylosis of the ossicles, and this also helps to protect the labyrinth. The patient feels a sudden pain and a loud noise in one or both ears. The pain is sometimes severe enough to cause fainting. There is slight hæmorrhage from the ear, which, however, ceases in a few hours. Examination reveals a clot obstructing the external meatus, or, later on, a blood-crust hiding the drumhead. After the ear has been carefully dried out—syndring should be absolutely avoided—a linear radiating tear is seen in the tympanic membrane. The edges of the opening are covered with blood-clot. If the tympanic membrane was previously diseased, one or two round or oval

perforations are seen, and in such cases the pain and hæmorrhage are very much less than in the type just described, in which the tympanic membrane was normal before the injury. As a rule, in all these cases the pre-existing deafness is but slightly increased. Treatment consists in plugging the meatus with aseptic cotton-wool or with a wick of iodoform gauze if bleeding be present. If kept dry, the tympanic membrane heals in a few days under a blood-crust, in those cases in which it was normal before rupture. If, on the other hand, the membrane was the seat of atrophic changes following otitis media, the perforations persist.

Milligan and Westmacott³ are satisfied that so-called *concussion deafness* is, in many cases, merely a passing phase in the temporary abolition of sensory impulses in a brain already anæmic as the result of physical fatigue and mental strain, the actual loss of hearing being induced by a sudden climax as it were, e.g., the bursting of a shell, accompanied as it is by general atmospheric commotion, and the not infrequent burial of the soldier in the earthwork of his trench. The writers have observed ten cases of the deaf and dumb state, all of which recovered within six weeks. They believe that the abrogation of function in all these conditions is due, not to an organic lesion, but to a temporary suspension of neuron impulses from the higher cortical cells of the central nervous system to the periphery. The hiatus is a central and not a peripheral one, for, in cases of sudden blindness and sudden deafness, no trace of any peripheral organic lesion could be demonstrated. Moreover, the rapid recovery of so many of the patients is a strong argument that no peripheral lesion was ever present. In many of the cases of so-called 'concussion deafness,' the ears were previously diseased, and Milligan and Westmacott believe that this has tended to throw the effects of the concussion more on the sentient than upon the conducting segments of the organ of hearing.

Horne⁴ states that *gun deafness* among the artillerymen themselves is in a very great measure preventable. According to Politzer, ruptures of the drumhead are scarcely ever met with since the introduction of breech-loaders. This is explained by the fact that the serving party withdraws to a distance of about twelve paces, excepting one man who attends to the firing and who also stands at a considerable distance from the gun. A prophylactic measure is to keep the mouth open, so as to equalize the atmospheric pressure on both sides of the drum of the ear, i.e., in the external meatus and in the Eustachian tube. It is a not uncommon practice among naval officers to chew a tooth-pick whilst big guns are fired. According to Horne, a piece of indiarubber would be more effective. It follows, from what has been said, that any obstruction to the passage of air up the Eustachian tube, whether in the tube itself or in the nose, must be removed.

With regard to the use of **Aural Plugs**, Suzuki holds that a preventive appliance which is to be used by several thousand men

must not be of a complicated nature. Sterilized cotton-wool is not efficient. Horne holds that an efficient plug must be close-fitting and impervious, and, whilst reducing intensity of sound, must not prevent hearing. The plug must be easy to insert and to remove intact. It must be non-irritating and as nearly antiseptic as possible. Ear plugs made of vulcanite, rubber, or celluloid cannot be supplied to fit exactly the peculiarities of any ear. The ideal plug should be readily moulded to fit exactly the channel of the ear. Further, it should retain its shape and remain ever plastic. For some considerable time a substance similar to jewellers' wax has been used. It is very important that this substance should be rendered aseptic.

The Mallock-Armstrong Ear Defenders⁵ are the invention of Mr. Arnulph Mallock, F.R.S. The group of parts forming the protective ear-drum is fitted in a cylindrical ebonite holder, and consists of seven components, the sensitive diaphragm enclosed between two wire gauzes being the most important of these. By reason of its lightness it transmits ordinary sounds freely, and can move within the narrow limits permitted by the proximity of the wire gauzes. When a great or rapid change of pressure occurs in the outer air, such as the moment of the explosion of a shell, gun fire, or even rifle fire, the diaphragm is momentarily pressed against the inner gauze, and further vibration of the diaphragm is checked while the pressure lasts. The plastic ear-plugs afford more protection than the Mallock-Armstrong 'ear defender' against very loud and sudden sounds.

REFERENCES.—¹*Oxford War Primers*, 1915 (Henry Frowde); ²*Presse Méd.* 1915, Feb. 25; ³*Jour. Laryngol.* 1915, 302; ⁴*Lancet*, 1914, ii, 462; ⁵*Brit. Med. Jour.* 1915, i, 25.

ECLAMPSIA. (See PREGNANCY, DISORDERS OF.)

ECZEMA.

E. Graham Little, M.D., F.R.C.P.

Davis,¹ following Professor Arthur Hall, of Sheffield, is inclined to ascribe infantile eczema more often to external than to internal causation, and he discusses treatment from the external standpoint. He derides the view that the skin eruption acts as a safety valve for the discharge of toxins from the system. The principal indication for treatment is the protection of the surface, for which purpose nothing equals the effect of **Zinc Oxide** spread on muslin or lint, which is worn as a mask when the eruption affects the face, as so commonly is the case. **Lenigallol** added to the zinc paste in the proportion of 10 to 20 gr. to the ounce may increase the efficiency of this in some instances. Painting with weak solutions of **Nitrate of Silver** is an effective remedy. In very intractable cases, small doses of **X rays** have succeeded in controlling the eruption. One-third of a pastille dose at intervals of a fortnight is recommended, not more than three such doses in succession being allowed. Light anæsthesia was necessary as a preliminary to the application to very young children. In the discussion which followed this contribution, Norman Walker expressed a preference for **Tar** in the form of lotion, and deprecated

the neglect of the old-fashioned mercurial purge. Nixon drew attention to an added or original urticarial factor in many cases, a view also expressed by Cranston Low.

Medalia² reports his results in the treatment of 51 cases of eczema with **Autogenous Vaccine**. In 34 of these, *Staphylococcus aureus* was grown in pure culture; in 2 it was found in association with *Staph. albus*, in 6 with *Streptococcus*; in 3 cases no culture grew, and in 6 cultures were not taken. *Staph. aureus* is therefore much the most important pathogenic agent. It was early found that in most cases of eczema, the dose required to be raised to 6000 million or even more before any reaction could be noted. The author depends more on the local reaction than on observation of the temperature or other clinical data. As a rule the dose may be repeated every twenty-four hours in acute cases, and three to seven days in subacute or chronic cases. The initial dose of staphylococcus may be 250 million, which may be rapidly raised by 50 per cent increments at each dose. If streptococcus is present as well, this vaccine should also be used, but in initial doses not exceeding 25 million. The dose may be pushed until there is local soreness at the site of injection.

REFERENCES.—¹*Brit. Med. Jour.* 1914, ii, 626; ²*Boston Med. and Surg. Jour.* 1915, ii, 187.

EMPHYEMA. (*Vol.* 1915, p. 244.)

ENDOCARDITIS, ULCERATIVE. (*Vol.* 1915, p. 245.)

ENTERIC FEVER. (*See* TYPHOID FEVER.)

ENURESIS.

Frederick Langmead, M.D., F.R.C.P.

A. B. Schwartz¹ makes a valuable contribution to our knowledge of this condition by a study of 226 cases, 148 of which were in boys, and 78 in girls. In 3 the enuresis was diurnal, in 124 nocturnal, while in 89 it was both. Many of those whose incontinence was nocturnal only, complained of increased frequency during the day, its severity depending upon the mental attitude of the child and the co-operation rendered by the school teacher. In only a small group of 21 was the family history inquired into. Of these, 10 were members of families other members of which experienced the same difficulty.

The relation of *tonsillar enlargement and adenoids* to enuresis has been much discussed. Of Schwartz's 226 children, 15 had had tonsils and adenoids removed, and 2 had adenoidectomy only. Surgical treatment for these conditions was needed by 26 other children, and 21 came to operation. Of these, 13 showed no improvement as the result, 6 were lost sight of, 1 recovered spontaneously a year later, and 1 who was reported to be better had also undergone circumcision. These results show that in this series of cases there was no connection between the adenoids and tonsils and the enuresis.

A study of the *urinary analyses* failed to demonstrate that any

particular change in the urine was related to the enuresis. 70.9 per cent of the urines were acid to litmus paper, 12.1 per cent were alkaline, and 17 per cent neutral. The urine frequently varied in reaction at different times. In a few instances the total acidity was determined by hydrogen-ion concentration, but the degree of acidity bore no relation to the severity of the incontinence. In a large proportion of the cases the specific gravity was high for the ages of the patients, and the urine was concentrated. Cases of pyelitis with incontinence as a symptom were not included in this series, as those improved under the usual treatment for that condition. No case of glycosuria was met with. The analyses of the urine in the small group which was studied more completely did not differ from the normal.

Abnormalities of the genitalia were present in only 29 of the 226 children. Two of these were girls, both of whom had hypertrophy of the clitoris. Redundant prepuce was present in 12, preputial adhesions in 5, and phimosis in 5. Of the series, 10, or only 6 per cent of the male children, were recommended for circumcision. Only 2 could be followed; one was reported to have improved, the other did not.

Neither *digestive disturbance* nor *anaemia* seemed to bear any relation to the enuresis.

A *nervous element* was recorded in 53 of the cases. These were classified as follows: nervous, 19; tic, 5; chorea, 8; retarded mental development, 14; very indistinct speech, 1; stutterers, 2; pavor nocturnus, 1; somnambulism, 2; imbecile, 1.

TREATMENT.—All the children examined by Schwartz were treated on the usual lines. Fluids were not permitted after 5 p.m.; the foot of the bed was elevated, a light supper only was allowed, and instruction was given that the children should be put to sleep on their sides on hard beds with only light covering. When necessary the diet was regulated. In no instance did these methods alone effect a cure. Drugs given to render the urine alkaline appeared to be of doubtful value. To change the reaction of the urine, much larger doses were found to be necessary than are generally recommended. One case showed no improvement after the administration of 20 gr. of potassium citrate thrice daily for several weeks, but a cure was afterwards obtained by the use of atropine. Like most observers, Schwartz was unable to obtain such good results from **Thyroid Extract** as those reported by Williams and Firth: 7 children were treated in this way without a cure being effected; 4 were improved, but 3 did not benefit. Only one of those who improved was mentally dull. Since children who are backward are those who react best to the drug, the report that only one was not mentally normal may explain its want of success in these cases. **Atropine** was used for 11 children. Of these, 2 were cured, 6 improved, and 3 were not benefited. In 2 cases the enuresis ceased spontaneously.

As Schwartz says, the results obtained in this series of cases resemble those reported by other writers, and point to the conclusion

that the cause of the enuresis varies with different children. In some the nervous element undoubtedly plays a part, in others, faulty habits. Local irritation is a predisposing factor. Excessive fluid leads to increased secretion of urine, but too little fluid produces a concentrated urine which, whether it contains crystals or not, may irritate the base of the bladder and provoke the desire to micturate.

REFERENCE.—¹*Boston Med. and Surg. Jour.* 1914, ii, 631.

EPIDERMOLYSIS BULLOSA. *E. Graham Little, M.D., F.R.C.P.*

Wise and Lautman¹ add a new and excellently described case to the short list of instances of acquired epidermolysis bullosa, and offer a very full consideration of the subject, with a copious bibliography. In this instance the disease was first noted at the unusually late age of nearly forty, the patient being an Austrian male, resident fifteen years in the United States. The distribution of the eruption was characteristic, the sites more especially liable to injury being selected; and the bullæ appeared only in response to injury, and not spontaneously. Pruritus was mostly absent. Numerous epidermic cysts were found, especially on the dorsum of the hands and over the metacarpo-phalangeal articulations, some in close juxtaposition with bullæ, some quite remote from these. They looked like milium bodies, and were uniformly small, not larger than a pinhead. Unfortunately no histological examination of these seems to have been made. The nails were normal. In many sites of old bullæ, atrophic white patches were noted. The mucous membrane was especially affected, bullæ forming on very slight provocation. The patient suffered from active tuberculosis of the lung, and showed scars of operations for removal of glands. The von Pirquet test, notwithstanding, is reported to have been negative. Histologically, the pathological changes in the skin where the bulla formed were few. Its site was seen to lie between the corium and epidermis. The elastic tissue below the bulla remained practically unaffected; the blood-vessels were unaltered. In both the latter features the case is unusual.

REFERENCE.—¹*Jour. Cutan. Dis.* 1915, June, 441.

EPILEPSY. (*See also MENTAL DISEASES.*) *J. Ramsay Hunt, M.D.*

Aldren Turner¹ presents his views on *epilepsy in its relation to cerebral tumour*, a subject of great practical importance. It has been recognized for a long time that tumour of the brain may give rise to seizures having features in no respect different from those occurring in the so-called idiopathic or genuine epilepsy. This variety of the disease forms one of the secondary or symptomatic epilepsies. But the type of case to which he calls attention in the article referred to is that form of symptomatic epilepsy which is characterized by the recurrence of fits in all respects resembling those of genuine epilepsy, over long periods of time before the symptoms or signs of the intracranial tumour obtrude themselves.

The diagnosis of epilepsy may be made legitimately in these cases on account of (1) The persistence of the seizures, amounting to no

less than sixteen years in one of his cases, without any physical signs of cerebral tumour being apparent ; (2) The generalized character of the attacks ; (3) The recurrence of the fits, as in ordinary epilepsy ; and (4) The definite arresting influence on the fits of the bromide salts. Epilepsy from cerebral tumour may be deemed to be a variety of 'late' epilepsy, being especially prone to come on during the later years of adolescence or in adult life.

As the underlying lesion is of a progressive nature, the fits tend to alter in character as the disease advances. This should be regarded as an important feature in the clinical study of this type of epilepsy, as, in the idiopathic disease, once the general type of fit has become established, gross variations are unusual. Thus, in some cases the disease was ushered in by general convulsions recurring at long intervals, which gave place in the later stages to attacks of a more definitely focal or epileptiform type. In another group, in the early stages, attacks having the features either of the 'Broca' or the 'uncinate' fit were replaced in the later stages by fits with generalized convulsions. In other cases major convulsive seizures gave place to attacks of *petit mal*, or vice versa.

The cases have been classified into two sub-groups according to the situation of the tumour.

1. *Epilepsy and Fronto-parietal Tumour*.—In tumours of this region the seizures are of two kinds : first, generalized epileptic convulsions with or without a warning sensation ; and secondly, fits of a more definitely focal type. Attacks of a minor or *petit mal* type may also be observed in this group. Thus, sensations, vertiginous attacks, dazed feelings, with or without muscular twitchings of the eyelids or face, are described.

As it indicates both the prominent feature of the attack and the locality of the lesion, the term 'Broca' fit may well be applied to a type of seizure which is characterized by sudden temporary aphasia sometimes associated with general convulsions, at other times more purely epileptiform, and having a facio-linguo-mandibular distribution. This latter type is characteristic of an irritative lesion of Broca's convolution and the adjoining parts. The fit may be followed by a temporary loss of speech.

2. *Epilepsy and Temporo-sphenoidal Tumour*.—Two types occur of seizures in association with tumours of this region : first, a generalized epileptic attack of either the major or minor variety of idiopathic epilepsy ; and, secondly, the 'uncinate' fit. The existence of certain signs, however, favours the presence of an organic lesion ; such are a well-defined local warning, the presence of some degree of post-convulsive hemiplegia, inequality of the deep reflexes on the two sides, unilateral abolition or impairment of the abdominal reflexes, and, above all, the development of an extensor plantar response. It is therefore important in all cases of epilepsy to examine the reflexes and the optic discs from time to time, especially if a decided change occurs in the character of the fits or a new symptom develops.

Turner² also considers in a general way the *outlook* in epilepsy. In estimating the curability it is necessary to define what is meant by a cured case. A cure has generally been considered to be an arrest of seizures for a certain number of years—the actual number of years varying from two or three up to ten or more. The most that can reasonably be expected in epilepsy is the arrest of the fits in conjunction with a mental condition so unimpaired that the patient is able to attend to business and earn his living according to his vocation. If the sedative drug can be permanently withdrawn (and this should be done gradually) without any relapse of the seizures and with retention of good mental faculties and memory, the case belongs to the group of cured epilepsy. The curability of any case depends to a large extent upon several factors, to which brief consideration may be given. The epilepsies of infancy and early childhood form one of the most unsatisfactory of the several types of the disease. There is one point, however, which ought to be borne in mind in connection with the early epilepsies, namely, the remarkable tendency to temporary arrest or remission of the fits which frequently takes place about the age of four or five years, a remission which may last for some years, or until puberty. When, however, we come to consider the epilepsies of puberty and adolescence, which are the common periods for the onset of the idiopathic disease, we have as a rule a not unfavourable type of epilepsy, provided that the fits are not too frequent, too severe, or of a psychological character; that the mental condition is satisfactory, and that the treatment is undertaken early and conducted persistently. In the late epilepsies, or that form of the disease which arises after thirty or thirty-five years of age, we find on the whole a favourable type, provided that the seizures are not symptomatic of a cerebral tumour or other organic lesion of the brain, and that alcoholism may be excluded. The majority of cases of late epilepsy are due either to chronic alcoholism or to degenerative cardiovascular disease. Quite a favourable type of epilepsy, on the other hand, is that which is characterized by the presence of jerks or jumps, frequently without loss of consciousness, the *petit mal moteur* of the French writers. Likewise the impaired mental condition found in many epileptics is not necessarily the direct consequence of the seizures, but may be an expression of the same neuropathic constitution that gives rise to the fits.

It is therefore obvious that when a case of epilepsy first comes under observation, certain features are present by which the outlook may be surmised. As features of a favourable character may be mentioned the commencement of the disease between the ages of sixteen and twenty, especially if an hereditary history is obtained and some obvious exciting cause for the disease is present; the commencement of the disease after forty or forty-five years of age, provided organic disease of the brain can be eliminated; the infrequent occurrence of the seizures; and the absence of any obvious mental impairment or well-marked stigmata of degeneration. In contradistinction to the

above-mentioned type of epilepsy, there is the incurable, chronic, or confirmed type, which finds its way eventually into institutions for epileptics. Turner's experience shows that once the mental condition has become materially affected in the direction of dementia, the outlook as regards any real amelioration is unfavourable, although the fits may be kept in abeyance over long periods by sedative remedies.

TREATMENT.—This occasionally deviates from those formal and well-recognized methods which are based upon the careful study and close knowledge of this disease. An excellent example of this is the use of **Crotalin** or snake-venom, as advocated by Spangler, of Philadelphia. The principle on which this treatment was founded assumed that the coagulability of the blood is increased in epilepsy and that crotalin tends to diminish this coagulability. The method has been given an extensive trial in America by a number of competent workers, and has been abandoned as worse than useless. Jenkins and Pendleton³ present the results obtained from this treatment in the Epileptic Colony at Dix Hill, North Carolina. The principles on which this treatment depends were refuted by laboratory tests, the following conclusions being formulated: The blood of epileptics is less coagulable than that of normal persons, and the coagulability is transiently increased by the use of crotalin. The number of convulsions is increased in direct proportion to the amount used. It seems to have no effect on the mental condition of the patient. All of which is absolutely contrary to the claims of the advocates of the treatment. Its use does, however, to a certain extent, satisfy the abnormal craving for medicine which all epileptics have.

D. A. Thom⁴ has also investigated this question, and summarizes the results obtained in America and abroad from the hypodermic injections of snake-venom. He states that in a previous paper, written early in 1913, he opposed stubbornly the foundation upon which this treatment was based. After selecting 203 cases free from any clinical evidence of organic brain lesions, he followed the technique as described by Roger Lee and Paul White, of Boston, and began to study the coagulability of the blood. Blood was taken for this purpose before, during, and after convulsions; 92 per cent of these cases fell within normal limits, 5.5 per cent showed less than the minimum limit, and 2.5 per cent over the maximum limit. He became convinced that there was no relation between the coagulation-time of the blood and convulsions in epileptics. In America almost every epileptic institution had given it a fair trial, and although much of his information came in such form that it was quite impossible to use it for a statistical table, there was no difficulty in understanding the reputation it enjoyed. From Pennsylvania, Virginia, and Michigan, with his own personal work, he gathered 58 cases and recorded them in tabulated form. Six, or less than 10 per cent, were improved; 20, or more than 35 per cent, became worse, and 3 cases died while treatment was being carried out. The remaining 29 cases were apparently unaffected by the drug.

Surely there is nothing in such a record to recommend a treatment so radical, and much to condemn it.

Under the rather imposing title, "The Probable Cause and Logical Treatment of Epilepsy," Charles A. L. Reed,⁵ an American surgeon, plunges into the pathology and treatment of epilepsy. Judging from the contents of his communication, which is preliminary, his interest in this question dates from certain experiences with the surgical treatment of various forms of constipation of mechanical origin, cases in which ileosigmoidostomy was performed for their relief. Among these were certain cases of epilepsy which appeared to be benefited by the short-circuiting of the colon, so that in a way the procedure which Reed advocates for the relief of epilepsy is a by-product of the Lane operation which was devised to relieve chronic constipation and check its autotoxic consequences. As some of his cases responded favourably to ileosigmoidostomy and colectomy as regards the character and frequency of their attacks, Reed immediately assumes that the cause of epilepsy is a toxin, probably of bacterial origin, and originating in the duodenal segment of the intestine.

Ligation of the main vessels of the brain, the carotids and the vertebrales, is an operation for the relief of epilepsy which has been tried in the past by a number of observers, and is now happily abandoned by most epileptologists. The risks of such procedures certainly greatly outweigh the doubtful chances of any benefit resulting. As is well known, almost any operative procedure may for a time diminish the frequency or severity of the attacks, and this has too often been taken as an evidence of benefit or cure, especially by the inexperienced, and notably by surgeons.

Following the example of Momburg, J. R. Eastman⁶ has performed the operation of *permanent partial compression of both common carotids* in eight cases of epilepsy.

One of the patients, a woman, age 46, passed into coma immediately after the operation, and although one of the silver wire loops was removed in twenty-four hours and the other four days later, she was left hemiplegic and aphasic. The results in the remaining cases, while free from this accident, were far from encouraging.

REFERENCES.—¹*Brit. Med. Jour.* 1914, ii, 969; ²*Ibid.* 665; ³*Jour. Amer. Med. Assoc.* 1914, ii, 1749; ⁴*Boston Med. and Surg. Jour.* 1914, -ii, 933; ⁵*Jour. Amer. Med. Assoc.* 1915, i, 1047; ⁶*Amer. Jour. Med. Sci.* 1915, ii, 365.

EPITHELIOMATA OF THE SKIN. (*Vol.* 1915, *p.* 252.)

ERYSIPELAS. (*Vol.* 1915, *p.* 253.)

ERYTHEMA NODOSUM.

E. Graham Little, M.D., F.R.C.P.

Foerster¹ reviews recent literature on the subject of the association of this disease with tuberculosis, and narrates two cases in which he claims to produce convincing evidence of the presence of tuberculous symptoms in patients suffering from erythema nodosum. In the first case a transient cervical adenitis and slight rise of temperature are

the sole indications pointing to tuberculosis, and in the second case a moderate reaction to von Pirquet's test, and the death of the child with symptoms of tuberculous meningitis, are the chief evidence relied upon for the association.

REFERENCE.—¹*Jour. Amer. Med. Assoc.* 1914, ii, 1266.

ERYTHRÆMIA.

Herbert French, M.D., F.R.C.P.

Amongst the recent cases of splenectomy, an unusual one, with bad results, is recorded by Douglas and Eisenbrey.¹ The case was that of a man, age 39, clinically suffering from splenomegalic polycythæmia (Vaquez's disease). The spleen came three inches below the costal margin, the red cells numbered 6,550,000 per c.mm., and the facies was of the dark-red cyanotic hue. Other forms of treatment failing, **Splenectomy** was resorted to, and the patient died ten days later. Ill effects from splenectomy are to be anticipated in splenomegalic polycythæmia cases, to judge from others reported already; but what was of special interest in this case was that the spleen was the site of extensive gross tuberculous deposits. This is not true of most cases of splenomegalic polycythæmia; and primary tuberculosis of the spleen is extremely rare; it seems, however, that such splenic tuberculosis may simulate non-tuberculous splenomegalic polycythæmia very closely.

REFERENCE.—¹*Amer. Jour. Med. Sci.* 1914, i, 479.

ERYTHROMELALGIA, SPURIOUS. *E. Graham Little, M.D., F.R.C.P.*

Parkes Weber¹ has recorded under this title several cases of a curious type of disease occurring almost exclusively in adult male Jews, the symptoms comprising a chronic cyanosis, usually of the foot, with intermittent pain, sometimes in the form of cramps; pulsation appeared in some instances to be absent in the pedal arteries. The blood-pressure was seldom raised, and signs of general arteriosclerosis or of chronic interstitial nephritis were lacking. Usually one extremity was affected before the other, and it was commoner in the lower than the upper limb. Periods of exacerbation alternated with periods of intermission of symptoms. The pain might be sufficient to prevent sleep. The cause remained obscure. Consumption of large quantities of cigarettes seemed a constant factor in the histories, but might be accidental. The patients were not characteristically in poor circumstances. Evidence of syphilis was almost invariably absent, so that 'non-syphilitic arteritis obliterans' is the label Weber would affix to this group. The treatment adopted included **Rest** in bed, ordinary diet, and administration of **Iodipin**. **Hot-air Douches** and hyperæmia by means of a **Bier's Suction Pump** were used alternately. **Acid Acetylodicum** seemed to modify the pain. The symptoms proved very intractable. Amputations were sometimes called for when the pain and resulting insomnia could not be mitigated. The disease had some resemblance to erythromelalgia, but was clearly distinguishable from it. [It seems to resemble the 'thrombo-angiitis' of Baerger.—*Ed. M.A.*]

REFERENCE.—¹*Brit. Jour. Derm.* 1915, 197.

EXOPHTHALMIC GOITRE. (*See GRAVES'S DISEASE, GOITRE, and THYROID INSUFFICIENCY.*)**EYE DISEASES, GENERAL THERAPEUTICS.** *A. Hugh Thompson, M.D.*

Vaccine Therapy.—Medalia, of Boston,¹ gives his experience of the value of this method. The cases thus treated by him included: (1) Infections following cataract extractions; (2) Perforating injury of cornea with infection of wound and hypopyon; (3) Ulcerative keratitis with hypopyon; (4) Styes; (5) Chronic dacryocystitis; and (6) One case of mucopurulent conjunctivitis of eighteen years' duration. The success with which these cases were treated depended to a large extent on the nature of the infecting micro-organism. Staphylococcus infection responded best to vaccines; pneumococcus next best, and streptococcus very badly. In view of the importance of beginning the treatment early, a stock vaccine consisting of staphylococci (150 to 250 million) and pneumococci (40 million) was always administered at once, and thereafter an autogenous vaccine as soon as it could be prepared, in small and often repeated doses. Of the first class of cases, staphylococcal infections following cataract extractions, 10 which came under the vaccine treatment were all benefited, and 9 of them recovered perfectly from the infection, the optical results depending on whether or not the vaccine was administered sufficiently early to prevent permanent damage to the cornea or other structure. The minimum number of injections was two, the maximum eighteen, but in nearly all these cases improvement was noticed in from twenty-four to thirty-six hours after the first injection. Of the second class of cases—perforating injuries with infection—four, with the staphylococcus as the prevailing organism, gave good results. Where the condition was due to the pneumococcus they were not nearly so good. In cases of hypopyon ulcers, repeated paracentesis of the anterior chamber, when performed alongside of the vaccine treatment, was found to yield better results than the latter alone. Styes showed uniformly good results. The case of chronic conjunctivitis showed a pure growth of *Staphylococcus aureus*, and was cured after nineteen injections of autogenous vaccine. Cases of chronic dacryocystitis, on the other hand, in which other organisms were predominant, showed no such favourable results.

Hexamine (Urotropine).—Kirkpatrick² records a case in which septic infection after cataract extraction cleared up under the administration of this drug. He states that patients take as much as 45 gr. a day without any complaint.

Subconjunctival Injections of Cyanide of Mercury.—Ever since Darier introduced this treatment, it has been practised more or less, and is now advocated both for subacute choroidal and ciliary inflammations, and also for septic conditions of the eye following wounds or operations. The great objection has usually been the excessive pain often experienced for two or three hours after the injection.

Darier claimed to have got over this by adding a few drops of acoin to the solution. Harry³ finds that acoin does not keep well and becomes opaque when sterilized. He recommends alypin instead, 10 min. of a 1 per cent solution to be mixed with 10 min. of a 1-1000 solution of mercuric cyanide for the first injection. For subsequent injections, at intervals of about five days, the mercuric cyanide solution may be increased each time by about 5 min., the amount of alypin solution remaining constant.

In this connection, it may be of use to set down some of the various substitutes for cocaine, with their first (proprietary) and second (non-proprietary) names:—

Novocain = Ethocain	Acoin = Guanicaine
Holocain = Phenocain	Alypin = Amydricaine

Optochin.—This is the proprietary name of ethyl-hydrocupreine, the new salt of quinine which was referred to in the 1915 volume of the MEDICAL ANNUAL (p. 255). It is said to be a specific for pneumococci, and was referred to by Sir Almroth Wright in a recent lecture before the Royal Society of Medicine⁴ as one of the few really useful antiseptics that exist. Maitland Ramsay⁵ finds it most serviceable in treatment of pneumococcal ulcer of the cornea in the form of a 1 per cent aqueous solution. The instillation is painful, so that it should be preceded by cocaine drops. He recommends that a swab of cotton-wool should be saturated with the solution and kept in contact with the ulcer for two minutes at a time, that this application be repeated two or three times a day, and that in the intervals hourly instillations of a 1 per cent solution of the drug be employed.

See also **Colloidal Silver**, p. 32.

REFERENCES.—¹*Boston Med. and Surg. Jour.* 1914, ii, 621; ²*Ind. Med. Gaz.* 1915, June; ³*Prescriber*, 1915, 113; ⁴*Brit. Med. Jour.* 1915, ii, 673; ⁵*Glasgow Med. Jour.* 1915, i, 321.

EYE INJURIES.

A. Hugh Thompson, M.D.

Traumatic Blindness.—Ormond¹ has published notes on thirty cases of soldiers blinded during the present war, the majority by bullets traversing the head from side to side in the region of the orbits. If the orbit is not actually involved in the wound, the eye generally escapes; but if it is it may be destroyed in one of three ways. First, the eye itself may be touched, when the destruction is almost necessarily complete. Secondly, the optic nerve may be severed behind the globe, in which case the eye may appear normal at first sight. Thirdly, without either the globe or the nerve being touched directly, sight may be destroyed by the vibrations of a high-velocity bullet traversing a more or less fluid medium. In these cases, "the force of the projectile is partly changed into vibrations which radiate in lines from the long axis of the bullet tract so forcibly, that they act as secondary missiles. We must suppose that such lines of intense vibration impinging on the outer surface of the eyeball, though unable to cause disintegration of the dense sclerotic, can pass through

it with sufficient force to produce rupture of the much less firmly knit choroid and retina immediately beneath. We must remember that during life the soft tissues in the orbits may be looked upon as being fluid, and the explosive effect of a bullet is proportional to its velocity, sectional area, and the amount of water present in the substance through which it passes. We find, then, many of these men possessing wholly sightless eyes, while the outer tunics of the eye itself show no sign of any injury."

Besides these cases of actual destruction of sight, there are others of psychical blindness due to shock, generally following the explosion of a shell in the immediate vicinity of the patient. In these cases there is no actual injury inflicted on the eye or orbit. The blindness is cerebral, and the patient recovers sooner or later. Whether or not there is an actual injury to the intracranial nervous mechanism which subserves the visual function is uncertain. Parsons,² who discusses these cases from the psychological standpoint, inclines to the view that there may be. Anyhow, it would be very unjust to treat these as cases of simulated blindness. At the same time, the problem of where to draw the line between cases of real though temporary blindness due to shock, and malingering, is an exceedingly difficult one. How difficult may be judged by the following extract from Parsons's article: "I have had one case in which the vision of the left eye improved to $\frac{6}{8}$, while that of the right improved to $\frac{6}{30}$. By manipulating various glasses I succeeded in making the patient read $\frac{6}{8}$ with + 0.5 D sph. and - 0.5 D sph. before the right eye and + 6 D sph. before the left. He had the chance of taking a commission, and was eager to do so. I feel convinced in my own mind, from his character and demeanour, that he was quite honest."

Anyone who has to do with the treatment of wounded soldiers returned from the war will be able to recall more or less similar cases. As an instance, under the care of the writer, a case of obstinate photophobia may be mentioned, with no underlying cause except the mental shock caused by a shell explosion.

Indications for Excision.—This subject was referred to in last year's MEDICAL ANNUAL (p. 256), but it is of such special importance at present that no apology is needed for returning to it. A restatement of some important facts about sympathetic ophthalmitis will not be out of place. The usual time for symptoms to appear first in the sympathizing eye is from the end of the third week after the injury onwards. Occasionally cases occur in the third week, and according to Fuchs³ the shortest recorded period is ten days. It is extremely rare for it to develop after the enucleation of the injured eye, but if the attack has already begun in the sympathizing eye the effect of enucleation is uncertain. There is therefore a short period during which it is legitimate to temporize in the case of a severely injured eye, if there is any hope of saving a useful amount of vision in it; but if the injury is due to a penetrating wound, and if signs of iridocyclitis are present at the end of the second week, it is highly dan-

gerous to delay excision any longer. In cases where a piece of shell or other foreign body has penetrated into the posterior part of the eye, an attempt may be made to remove it if it is magnetizable, but if not, and if it is causing inflammatory symptoms, the eye should certainly be excised. A difficulty may occur when the presence of a foreign body is proved by the x rays while useful sight yet remains and inflammatory symptoms are absent; supposing the foreign body to be of such a nature that it cannot be removed by the magnet, is it legitimate to leave it? Such eyes are said to be liable to set up sympathetic inflammation in the fellow eye at any time. They can only do so, however, by first becoming inflamed themselves. Therefore, if the patient himself is warned of this danger, so that at the first signs of pain in the eye he may consult a surgeon without delay, it is legitimate to leave such an eye. Moreover, we must be quite certain, before excising, that the skiagram is correctly interpreted. The writer has recently had a case of a soldier where the skiagram showed several minute foreign bodies which were supposed to be in the globe, but which proved on examination to be in full view on the outside of the sclera. After they were removed the skiagram showed nothing.

In cases where there is no foreign body in the eye, but where from the nature of the injury the possibility of sympathetic inflammation has to be considered, the following are the chief danger signals (Brownlie⁴): (1) A plastic iridocyclitis, evidenced by a muddy injected iris, with perhaps exudate in the pupillary area and perhaps hypopyon. Keratitis punctata is not usually seen at an early stage. (2) A definite yellow reflex from the vitreous showing a plastic or suppurative uveitis. (3) At a later stage, when the iris is becoming atrophic or the vision practically nil, tenderness on pressure of the ciliary region (as in feeling the tension, which in these cases tends to be low) is an important sign that the eye is not a safe one for the patient to keep.

The distinction must be borne in mind between sympathetic irritation and sympathetic inflammation. The former is the term given to symptoms of a purely subjective nature in the uninjured eye, due not to any organic disease but to a reflex nervous mechanism. These symptoms are photophobia and lachrymation, and a certain amount of pain. They are a danger signal pointing to the possibility of sympathetic inflammation, but they are not sympathetic inflammation itself, and they are immediately stopped by the excision of the exciting eye. The earliest symptoms of sympathetic inflammation are a ciliary blush and deposits of lymph on the posterior surface of the cornea. Later, plastic iritis with synechiæ is evident.

It is often said that an eye in which inflammation has gone on to panophthalmitis is no longer liable to set up sympathetic disease, but this is not an absolute rule. Moreover, there is a certain risk that the inflammation may spread up the sheath of the optic nerve and cause meningitis. On the other hand, if such an eye is excised in

the ordinary way, there is thought by some to be an even greater risk of an immediate spread of the disease so as to cause meningitis. Especially is this danger to be reckoned with in cases where orbital cellulitis is present, and this may very well be so after wounds, even before panophthalmitis has occurred. To obviate the danger in such cases, the following method is recommended by Lister,⁵ and has been largely practised by surgeons at the front :—

(1) The contents of the globe are thoroughly eviscerated, all traces of retina and choroid being scraped away to avoid any chance of sympathetic ophthalmia ; (2) The muscles are divided ; (3) The sclerotic is pulled forward and divided far back, leaving only a frill round the intact optic nerve.

The actual procedure may be varied according to the following circumstances :—

a. When the opening in the globe is small, or has firmly healed, the conjunctiva and muscles are divided first, as this is, of course, much more simply done while there is some tension in the globe. The cornea is then cut away and the contents of the eye are carefully scraped out, either with a large sharp spoon or a scoop made for the purpose, and the process completed by scrubbing out the sclera with a swab held in a pair of forceps. The sclerotic is drawn well forward by two or three pairs of pressure forceps, and cut far back, leaving a frill round the nerve as described above.

b. If the globe has an open rent or wound, the contents should be scraped out first and the shell of sclerotic and conjunctiva thoroughly washed. The sclerotic is now packed firmly with a strip of gauze to facilitate the division of the muscles, which is next performed. The gauze is now removed, the sclera drawn well forward and divided as before.

c. Where the globe is split open in all directions, as is often the case when a bullet has passed through it, packing is impossible. In this case, after scooping and wiping out the contents of the eye, the separate portions of the sclera can be picked up and made taut with pressure forceps and the muscles dissected off as far back as possible. After drawing the bunch of forceps forwards, the sclerotic is now cut through, as described above.

The three points to be kept in mind are : (1) To remove all trace of retina or choroid ; (2) To take away the bulk of the sclerotic ; but (3) To leave a frill of sclerotic round the intact optic nerve.

In this way, all risk of infection of the nerve sheath and of the meninges as the result of the operation is avoided ; there is very little bleeding, the shock due to cutting the optic nerve does not occur, drainage for the cellulitis is afforded, and the healing process is not prolonged by leaving in the bulk of the sclerotic.

Injury from Bursting Golf Balls.—A source of traumatism to the eye unconnected with the war has been noted by several surgeons, chiefly in America—the explosive discharge of the liquid core of a golf-ball when cut open with a knife. This accident might seem too

unlikely to mention, but it has occurred several times. The latest instance is recorded by Elliot and Inman.⁶ The cores of golf-balls are surrounded by machine-wound indiarubber ribbons, and are thereby subjected to great pressure. It follows that, when cut open, any fluid they contain is expelled, sometimes with explosive force and noise, to a considerable distance. The contained fluid is often of an irritating nature, and many of the accidents recorded have resulted in serious loss of vision.

Definition of Blindness.—The importance of an exact definition of blindness is obvious in connection with projected legislation for pensions for the blind. If it is made to include only those who are 'stone-blind,' i.e., those in whom even perception of light is absent, it is easy, but its utility is very small. What is wanted is some definition which would include all who, for purposes of practical life, or of earning their living, are blind, while excluding those with merely defective sight. The matter was the subject of a discussion at the Royal Society of Medicine⁷ (Section of Ophthalmology), some difference of opinion being discovered as to the best way of defining blindness from this point of view. Subsequently a report was prepared at the request of the Local Government Board by the Council of the Section.⁸ This points out that as regards children, an authoritative rule is already in existence, an Act of 1893 defining 'blind' as 'too blind to be able to read the ordinary school books used by children.' This rule appears to work satisfactorily, and the Committee do not recommend any modification of it with regard to children. Yet it points out that certain children, e.g., those with high myopia, have fairly good vision and yet cannot follow the ordinary school course without further loss of sight. These children are at present classed as 'blind,' which is an obvious misnomer, besides placing a stigma on them which their condition does not justify. They should be taught in special schools or special classes, and called not blind but weak-sighted. As regards adults, the committee recommend that the expression 'blind' should be defined as 'too blind to perform work for which eyesight is essential.' They deprecate any attempt to stereotype by law any numerical definition of blindness, such as an acuity of vision of $\frac{6}{60}$. They point out that though a person with visual acuity better than this may usually be able to perform some work needing eyesight, and though a person with acuity of less than $\frac{3}{60}$ may not usually be able to do so, there are special cases which must be judged on their merits, and moreover, the nature of the blindness must be taken into account. A glaucomatous patient with very contracted field and fair central vision may be far more disabled for practical purposes than a patient with a relative central scotoma and full peripheral field whose acuity of central vision may be considerably worse. The Committee therefore advise that every applicant for a legal blind benefit should be duly examined by a medical practitioner with competent knowledge of diseases of the eye, that the certificate should state the grounds on which the

applicant is certified eligible or ineligible as the case may be, and that it should state whether he should be re-examined at some future time. Thus not only would the degree of blindness be certified, but also its nature, whether curable by operation (e.g., cataract), by treatment, or by the voluntary action of the patient (e.g., tobacco amblyopia), or whether incurable.

If these recommendations are carried out, the medical certification of blindness will follow the precedents already set by the Lunacy Laws and the recent Mental Deficiency Act.

REFERENCES.—¹*Guy's Hosp. Gaz.* 1915, 221; ²*Lancet*, 1915, i, 697; ³*Fuchs' Textbook*, transl. by Duane, 4th ed. 413; ⁴*Ophthalmoscope*, 1915, 547; ⁵*Brit. Med. Jour.* 1915, i, 418; ⁶*Ibid.* 501; ⁷*Proc. Roy. Soc. Med. Sect. Ophth.* 1915, viii, No. 3; ⁸*Ibid.* No. 9.

EYE, PARALYSIS OF. (See also EYE, SYPHILIS OF.)

A. Hugh Thompson, M.D.

From the point of view of diagnosis, cases of ocular paralysis may be theoretically divided into two groups: those in which the paralysis is a symptom of some grave underlying condition of the nervous system, and those in which it is an isolated local phenomenon. Unfortunately, it is not always easy or even possible to say offhand to which of these groups any given case belongs, at any rate without keeping it under observation for a considerable space of time, and especially is this true of those cases of transient paralysis of an eye muscle which are sometimes seen in patients otherwise quite well. These may have a local cause, for instance traumatism; but they may also be early cases of tabes or disseminated sclerosis, the paralysis appearing months or even years before any other symptoms, or they may be connected with various other abnormal conditions of the nervous system. In this connection a paper by Hawthorne¹ may be consulted. The following are some of the conditions of which examples are given. (1) In tabes dorsalis in an early stage, a patient may have had Argyll Robertson pupils and deficient knee-jerks for years. A transient ocular paralysis may be the first symptom to cause him any discomfort. (2) In general paralysis also, transient ocular paralyses occur. (3) Ocular paralyses are rare in bulbar paralysis. (4) In disseminated sclerosis they are common. (5) Paralysis of two or more ocular muscles on one or both sides due to nuclear disease is generally the result of syphilitic infection. The disease does not as a rule spread to the nuclei of the other nerves lower down in the mid-brain. (6) Cerebral tumour. (7) Meningitis. (8) Peripheral neuritis, which may be due to glycosuria, or lead, or may be associated with Bell's paralysis. Post-diphtheritic paralysis is also of this nature. There remains a certain residuum of cases in which no cause for the paralysis, either general or local, could be discovered. The important point is never to regard these cases as of merely trivial importance until all possible forms of underlying disease have been excluded.

REFERENCE.—¹*Univ. Med. Rec.* 1915, 289, 405.

EYE, SYPHILIS OF.*A. Hugh Thompson, M.D.*

The large part played by syphilis in the causation of diseases of the eye is well known, but until the advent of the Wassermann reaction it has not been possible to determine exactly how large this part is. W. H. Manson, T. J. Mackie, and H. E. Smith¹ have gone some way in such a determination by an examination of the blood of 250 patients, all of whom were suffering from diseases either known to be sometimes caused by syphilis or else of uncertain etiology. With regard to some of the conditions, the numbers are too small to form a basis for any valid conclusion, but the following points may be noted :—

In *interstitial keratitis* the reaction was positive in 88·8 per cent. Since a positive reaction is in itself conclusive evidence of the presence of syphilis (apart from a few other diseases rarely found in this country), whereas a negative reaction is inconclusive evidence of its absence (the authors say that only 75 per cent of cases in the tertiary stage yield a positive result), this percentage tends to prove that interstitial keratitis apart from syphilis must be very rare. It may be noted that eight cases of 'strumous' keratitis which were examined all gave a negative result.

Of the patients suffering from *iritis* and *iridocyclitis*, 54 per cent were proved to be syphilitic. On the other hand, 3 cases of cyclitis uncomplicated by iritis all gave a negative reaction, and only 5 out of 26 cases of *choroiditis* and choroidal atrophy gave a positive reaction. This last proportion is decidedly less than what most of us would expect to find, especially as cases of myopic choroiditis are not included but put in a separate category.

The proportion (over half) of cases of *optic atrophy* proved to be syphilitic is what one would expect, having regard to the fact that the commonest cause of this condition is tabes. In this connection it was found that all the ten cases in which the atrophy was diagnosed as primary gave a positive reaction.

Perhaps the most interesting point in the paper is the result of the test carried out on cases of *paralysis of the ocular muscles*. Out of 13 cases, 7 gave positive and 6 negative results. Of the positive cases 4 were of the third nerve, 1 the fourth, 1 the sixth, and 1 the sixth and third combined. The negative cases were all of the sixth nerve. This would tend to show that the external rectus, the eye muscle most subject to paralysis, is relatively immune to syphilitic disease. The point is one which requires further investigation.

The paper just mentioned has been supplemented by a further report by the first two authors (Mackie and Manson)² who have applied the *luetin test* (cf. MEDICAL ANNUAL, 1914, 570) to fifty of the same patients whom they had previously tested by the Wassermann reaction. Their results show that many patients who give a positive reaction to the first test give a negative to the second, and vice versa. Most striking was this in the cases of optic atrophy. Eight cases already subjected to the Wassermann test were re-examined

by the luetin test. Five who were negative to the Wassermann were positive to the luetin test. Three who were positive to the former were negative to the latter. In these cases the one test appeared to act as complementary to the other. Before syphilis can be excluded it appears to be necessary to apply both.

REFERENCES.—¹*Brit. Med. Jour.* 1915, i, 324; ²*Ophth. Rev.* 1915, 366.

EYELIDS, DISEASES OF.

A. Hugh Thompson, M.D.

Blastomycosis is a disease due to a vegetable fungus, which may either cause general symptoms which are almost always fatal, or may be strictly local, in which case the lesion is confined to the skin, and in a large proportion (25 per cent) attacks the eyelids. It has been called the 'Chicago disease,' and hitherto all the cases described have been from certain cities in America; but Jackson¹ suggests that the apparent frequency of its occurrence in certain centres is due rather to the greater frequency of its recognition in those places than to any restriction of its geographical distribution. The two cases that he has himself observed had been previously treated by many oculists who had failed to recognize the condition. The active lesion, of which the *Plate XIX* is an example, at once suggests epithelioma. Tubercle and syphilis have also to be excluded, but the diagnosis must ultimately rest on the microscopic finding of the organism. In the case pictured the margins of both lids are ulcerated, the edges of the ulcers being thickened, but quite soft to the touch. The surface of the ulcers presented large flabby granulations and a moderate purulent discharge. Smears from the pus showed a few diplococci and the rounded and budding figures of the so-called blastomycetes. The conjunctiva was not affected. The remarkable fact about these cases is the rapidity with which they heal under full doses of **Potassium Iodide**. In this case the lesions had completely healed three weeks after the commencement of the treatment, the iodide having been given at first in doses of 10 gr. three times a day, increased to a maximum dose of 37 gr. three times a day. Jackson suggests that cases may often have been treated with this drug with success under the mistaken idea that they were syphilitic, without their true nature having been discovered. At a later stage of the disease, scars may be formed, causing eversion of the conjunctiva and ectropion, but the eyes never appear to be directly attacked.

X-ray treatment of trichiasis, *see p. 57.*

REFERENCE.—¹*Jour. Amer. Med. Assoc.* 1915, ii, 23.

FÆCES, EXAMINATION OF.

O. C. Gruner, M.D.

G. H. Almond¹ gives a good summary of the methods of clinical laboratory examination of the fæces. He deals especially with the *microbic* conditions. There are three types of cleavage in the intestine, with one or other of which a given specimen of fæces should be classified for clinical purposes. (1) The indolic type. The ratio etheræal sulphates in the urine is evidence of indolic decomposition in inorganic sulphates

PLATE XIX

BLASTOMYCOSIS OF THE EYELID



The lesion was progressive for seven months. Cicatricial contraction comparatively slight.

Kindly lent by the American Medical Association

the intestine. Normally the value is $\frac{1}{10}$; it may alter to $\frac{1}{8}$ or $\frac{1}{4}$. (2) The saccharobutyric type is due to the growth of anaerobic bacteria. A smear of the fecal matter will show a preponderance of Gram-positive bacilli. Stercobilin is marked. (3) The indolic and saccharo-butyric types may be blended in cases of neurasthenia. The effect of diet must be considered. A protein diet yields a predominance of *B. coli* with large and small subtiloid organisms. A carbohydrate diet gives a predominance of Gram-positive bacilli (*B. bifidus*, *B. aerogenes capsulatus*).

For occult blood, this author advises benzinid perborate. 0.1 gram benzinid, 0.1 gram sodium baborate, and 10 c.c. glacial acetic acid are mixed together. 5 c.c. liquid fæces are mixed with an equal volume of glacial acetic acid, shaken well, and 10 c.c. ether added. 5 c.c. of the extract are placed in a white dish, dried, and 1 c.c. of the test solution added. An intense blue will result in the case of blood being present.

Urobilin.—A few grams of fæces are rubbed into a paste with water, and an excess of concentrated alcohol corrosive sublimate is added. The mixture is again rubbed up and filtered into a clean test-tube. A rose-red should be seen. A few c.c. of 10 per cent alcoholic zinc chloride will give a green fluorescence (Edelmann²). Robertson³ considers the quantity of urobilin in the stool is an approximate measure of the degree of hæmolysis occurring in the body. Its estimation is of clinical value in the diagnosis of conditions questionably hæmolytic in character. The method he employs is that of dilution until absorption bands disappear.

REFERENCES.—¹*Bristol Med.-Chir. Jour.* 1915, 95; ²*Wien. klin. Woch.* 1915, 978; ³*Arch. Inter. Med.* 1915, 1072.

FEET, AFFECTIONS OF.

W. I. de C. Wheeler, F.R.C.S.I.

Minor injuries to the feet and obscure tenderness in the bones give rise frequently to much suffering, and baffle the diagnostic skill of competent practitioners. The bony spine which develops in association with rheumatism and gonorrhœa on the under surface of the os calcis must be borne in mind and can readily be recognized by an x-ray photograph, and its removal is followed by complete cure.

Kellogg Speed¹ lays stress on *injuries of the sesamoid bones of the great toe*. He believes that the "causes of sesamoid injury are usually (1) Direct violence due to a heavy object falling on the foot; (2) Squeezing of the great toe joint between heavy masses; (3) Falls from a height, striking full weight on foot; (4) Sudden increase in weight-bearing force when carrying heavy objects and missing footing, with force expended through great toe joint.

"When the foot and toe have been subjected to trauma or crushing, the injury to the soft parts or the toe alone may demand all attention. Such an injury would be cared for surgically, and later, after it was healed, when the patient came to bearing weight on it, the tenderness at the base of the toe would increase with use, and finally, if the efforts

at use were persistent, end in disability. Physical examination reveals little, but by finding the same point of tenderness over the head of the metatarsal by plantar pressure one may consider this fracture as possible, and make a skiagram to give a positive diagnosis."

Five cases are quoted, four being fractures of the internal sesamoid. This is explained by the fact that the external sesamoid is a little lateral to the head of the metatarsal bone, and therefore not so directly subjected to the pressure trauma or sudden increase in weight-bearing force. *Plates XX, XXI.* A prolonged rest from weight-bearing in a shoe will give relief, but the condition is apt to return. The best treatment is removal by operation. Speed makes a "lateral incision well above the heavy plantar skin, about 2 in. in length, along the outer surface of the great-toe joint. The plantar flap is reflected downward and dissection made inward, keeping just proximal to the line of the joint. By careful palpation through the plantar skin the bones can be located. They should be dissected out, both from the fibrous covering of the tendon, without opening the joint structures. Both should be removed, for if one is left without its companion's support, it would soon become the source of irritation on account of its localized pressure. Deep tissues are closed by catgut, and skin by horse-hair or clips. As soon as the stitches are removed, the patient will find that no pain results in bearing weight. After twelve to fourteen days, ordinary occupation can be resumed."

REFERENCE.—¹*Ann. Surg.* 1914, ii, 478.

FILARIASIS. (*Vol.* 1915, p. 263.)

FINGERS, INJURIES OF.

W. I. de C. Wheeler, F.R.C.S.I.

S. Davis¹ emphasizes the advisability of saving all the tissues possible after traumatic loss in the case of the terminal phalanx. Tissue transplantation is advisable but impracticable, as the treatment must be applicable to out-patients. The loss of all or portions of the terminal phalanx is of considerable economic importance to certain skilled workmen.

The most promising procedure seemed to be that of stimulating the growth of granulation tissue on the end of the stump, and in some way to confine the growth to the desired size and direction. In searching for means to accomplish this, Davis thought that a stiff non-adhesive material which could be wrapped around the finger would be satisfactory. After a number of experiments, he found that sheet celluloid $\frac{1}{16}$ in. thick would be best for the purpose. This material was transparent, and could be cut in a pattern which, when rolled, formed a tube adjustable to the size of the finger.

The stump is painted with tincture of iodine. The shaped piece of celluloid, after being soaked in mercuric chloride, 1-1000, for a sufficient time, is sponged off with ether or alcohol. It is then wrapped around the finger and secured with narrow adhesive strips, thus making a tube which is slightly smaller at its free end than at its base. When the tube is properly adjusted, it will hug closely the edge of the

PLATE XX.
INJURIES OF THE GREAT-TOE SESAMOIDS
 (KELLOGG SPEED)

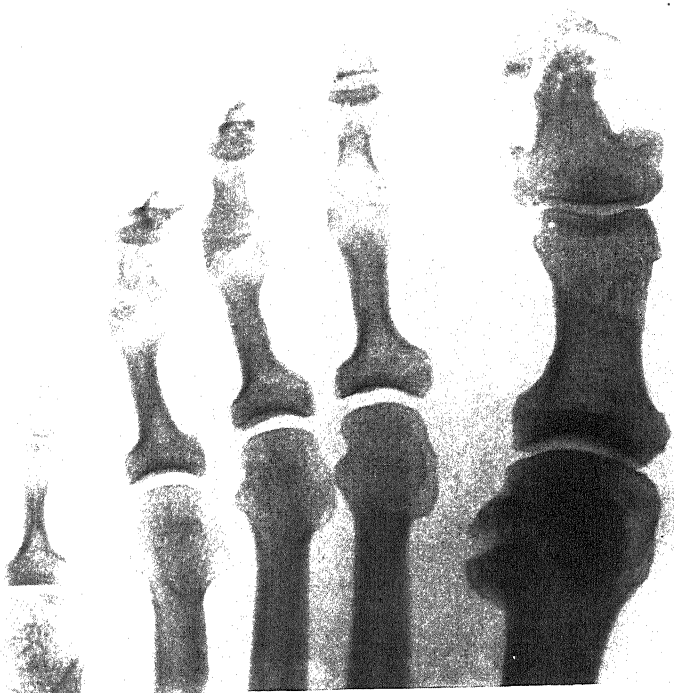


Fig. A.—Crushing injury, great toe. Note distal phalanx mashed and external sesamoid under metatarsal bone broken across. After soft parts were healed there was great pain beneath this joint and complete disablement. Fragments slightly separated.



Fig. B.—Side view of *Fig. A.* showing the enlarged sesamoid. While this is the external bone, its shadow can be seen greatly overlapping the normal bone and its pressure effect understood.

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PLATE XXI.

INJURIES OF THE GREAT-TOE SESAMOIDS—continued (KELLGREN SERIES)

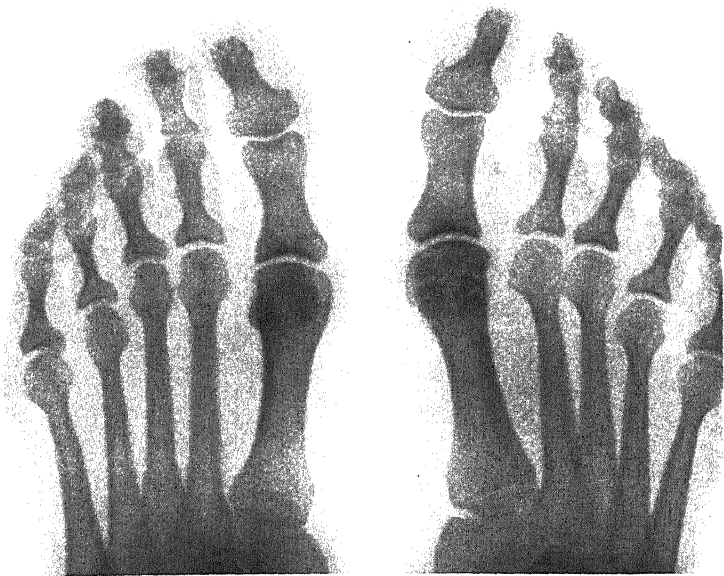


Fig. 1.—Fracture of internal sesamoid, right foot. The shadow of the external is indistinct, and it may also have been broken. Operation refused.



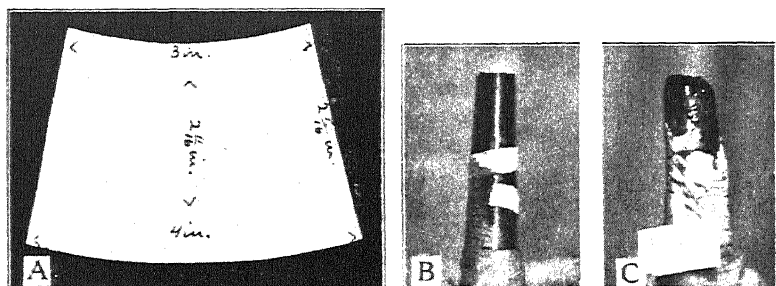
Fig. 2.—Side view of a case of internal sesamoid fracture. Note separation of fragments and thickening of bone. Female.

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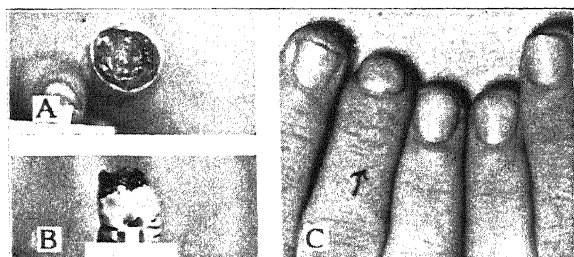
PLATE XXII.

TREATMENT OF FINGER STUMPS WITH CELLULOID

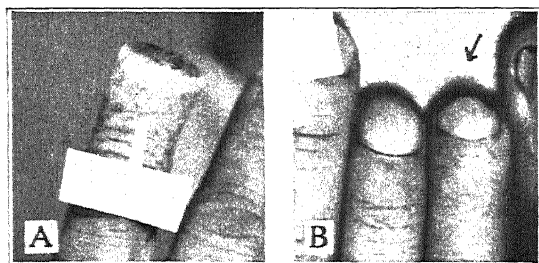
(STANGE DAVIS)



A. A convenient pattern by which to cut the celluloid; B. The celluloid tube in place, partially filled with a blood-clot; patient seen shortly after accident. C. After removal of tube; the line of the amputation can be seen, and above it the moulded clot. Note the snug fit of the tube in B, and the clearness with which the skin can be seen through it.



A. End view of finger stump; celluloid tube applied twenty-four hours after accident. B. Three days later; note clot. C. Fourteen months after accident; the wound was healed in thirty-five days.



A. Finger stump four days after accident, before application of celluloid tube. B. Finger ten and a half months after accident; the healing was complete in thirty days.

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wound, and will gradually become larger until it impinges on the first interphalangeal joint. The celluloid may extend as far beyond the finger tip as is needful, and, in addition to its primary function, it also serves as a splint for the finger and as a protection to the wound. (*See Plate XXII.*)

In cases seen early, a blood-clot is allowed to form in the tube. This clot serves as a scaffold for granulations. If the soft parts are lacerated and spread apart, they are gathered together and held in place by the tube. In those cases which are seen after the granulations have started, every effort is made to stimulate their growth and to train this growth along the tube. Any desired medication may be applied to the wound after the celluloid is in place, either by pouring it into the tube, or by packing the tube with gauze. The dressing in this way comes in contact with the wound, and is confined by the tube. A loose gauze plug is then placed in the mouth of the tube, and over all a small dressing secured by a bandage. In some cases, when the granulations are sufficiently advanced, it is advisable to cover them with small deep grafts, in order to give a more stable and quicker healing. It might have been better to have grafted more of this series.

The cases seen soon after the accident give the best results as far as increased length is concerned. Building new tissue on the end of the stump is slow, but in the end it will preserve the bone which remains, and cover it, and will also often add materially to the length of the stump. If the joint is uninvolved, even a short bit of terminal phalangeal bone will form the basis for a shortened terminal phalanx, which may be voluntarily extended and flexed, and can be used nearly as well as an intact terminal phalanx.

REFERENCE.—¹*Jour. Amer. Med. Assoc.* 1915, i, 1647.

FOOT-AND-MOUTH DISEASE IN MAN.

Herbert French, M.D., F.R.C.P.

Boismoreau had special opportunities of witnessing the supervision of this disease in man in the course of a widespread epidemic in animals. His notes on the subject merit attention.

The epidemic started in 1912, and although certain precautions were enforced, it spread far and wide, attaining its maximum intensity in July and August of that year. It was then that he met with cases in his practice.

Milk seems to be the vehicle of contagion, and it is evidently dangerous to take cow's milk in times of epidemic, even if the animals are apparently healthy, unless it has been well boiled. However, it is evidently not the only means of transmission. Handling the cattle and eating food with unwashed hands may also be responsible, the saliva and pus of sick animals being very contagious.

The period of incubation would seem to be five or six days. There is a slight rise of temperature, with dryness of the mouth, followed by salivation and trifling disturbance of digestion. In the course of a

few days we get aphthous stomatitis, which may undergo transformation into tonsillitis or aphthous sore throat. Should the nature of the disease be overlooked, or in the absence of adequate treatment, constitutional troubles may supervene: a paratyphoid state, renal complications, submaxillary adenitis, etc. It is at this stage that we meet with abscesses of the feet and hands.

Whenever foot-and-mouth disease is epidemic among cattle, we must be on the look-out for instances of contagion in man. In the earliest stage no diagnosis is possible; but as soon as aphthous stomatitis makes its appearance, we have only to distinguish it from ulcerative stomatitis, thrush, syphilitic lesions, scurvy, and diphtheria.

In ulcerative stomatitis there is no true vesicle, merely a raising up of the epithelium by infiltration of the subjacent tissues, and the ulcer becomes visible on scraping away the epithelium. These lesions usually begin on the gums over the last molar teeth. Then, too, the lesions are much more extensive and deeper than in aphthous stomatitis (foot-and-mouth disease).

Thrush is recognized by features which are familiar to all of us—the little patches of milky-white, like flakes of coagulated milk, are quite different from the characteristic little ulcers, covered with a thin layer of epithelium, met with in the disease under consideration.

There ought to be no difficulty in distinguishing it from syphilitic lesions, which are well known, and the same remark applies to mercurial stomatitis. In doubtful cases it may be advisable to treat the local lesions after instituting antisyphilitic treatment. In the course of an epidemic, no doubt can arise except in obviously syphilitic subjects, but the primary chancre and mucous patches hardly expose us to the risk of error. Apart from the constitutional symptoms of scurvy, the appearance of scorbutic gingivostomatitis is very characteristic; the wine-blue gum line, the ecchymoses and induration give their special stamp, and the patient's aspect is quite different.

Diphtheria rarely limits itself to the buccal mucous membrane, and the false membrane can be distinguished readily from the ulcerations met with in foot-and-mouth disease. In case of doubt, bacteriological examination will settle the matter.

Acute tuberculosis of the pharynx or mouth is painful and is accompanied by intense dysphagia. The *Leptothrix mycosis* is easily identified.

Should the manifestations be limited to the hands and feet, diagnosis might be difficult in the absence of the characteristic stomatitis.

Foot-and-mouth disease in human beings does not seem to be a grave affection, but we must distinguish between its supervention in children and in adults. In the former it may give rise to serious constitutional disturbances. In Boismoreau's first case the infant's plight for twenty-four hours was most alarming. The gravity of the attack no doubt depends greatly upon the severity of the infection, so that infants fed upon the unboiled milk of sick cows are liable to very serious manifestations.

PROPHYLAXIS AND TREATMENT.—Refuse all milk from a contaminated

farm. An animal may be sickening for the disease without showing any outward and visible signs, so that in presence of an epidemic they are all potentially dangerous. Farmers should be informed of the necessity for cleanliness in manipulating milk, and for their own sake the sick animals should be carefully isolated from the healthy stock and the hands of attendants frequently washed in a 1-1000 solution of oxycyanide of mercury. All manure should be burned or buried deeply after watering with a powerful antiseptic. In epidemic times we must beware of butter.

In children **Antidiphtheritic Serum** by the mouth or by injection yields good results. The ulcers should be cauterized with **Chloride of Zinc**, 1-30, and the bowels kept open. In adults the chief treatment consists in repeated gargling with **Chlorate of Potash** or **Borax**, frequent lavage of the mouth with diluted **Peroxide of Hydrogen**, either alone or associated with **Thymol**.

REFERENCE.—¹*Med. Press and Circ.* 1914, ii, 170.

FOREIGN BODIES, LOCALIZATION OF. (See p. 39.)

FRACTURES.

W. I. de C. Wheeler, F.R.C.S.I.

That the treatment of compound fractures is by no means a settled question is proved by the flood of literature containing diverse opinions which has appeared since the outbreak of war. The advocates of operative treatment as a routine procedure for bad compound fractures have not held possession of a non-contested field. On the contrary, there is a large school of experienced surgeons who find that the best results can be obtained by intelligent conservative methods with the use of simple and efficient appliances. Countless splints have been devised to meet the exigencies of war injuries; their parentage in the case of the lower extremity can usually be traced to such well-known appliances as Thomas's knee bed-splint and Jones's abduction frame.

The question of the advisability of using Lane's plates in cases of compound septic and complicated fractures is still *sub judice*. Many surgeons maintain that it is a great advantage to obtain rigid fixation of an open fracture by the introduction of a Lane's plate, and argue that by the time the plate becomes loose the fragments have consolidated sufficiently to prevent subsequent deformity. At the same time the dressing of the wound is rendered easy and the patient is comparatively free from pain. On the other hand, it would appear that the introduction of the plate is accountable for necrosis in fragments which, if treated otherwise, would have survived the sepsis. It is admitted that a metal plate retards the formation of callus, and unless means be taken to prevent it, the fractured bone may angulate and the fragments over-ride as the plate loosens, producing great deformity. In our present state of knowledge it offends surgical instinct to introduce plates and screws into a septic wound unless there is some special indication, and that excellent results can be

obtained without recourse to this procedure has been abundantly proved by the experiences of such authorities as J. B. Murphy, of Chicago, and Robert Jones, of Liverpool. Murphy is content to meddle as little as possible with a compound fracture, and to rely in many cases for the correction of deformity on a secondary operation, after the wound has soundly healed.

The simplicity of the appliances recommended by Jones must appeal to every experienced surgeon, and his methods, if studied carefully, will convert to conservatism many whose enthusiasm heretofore has wandered in the direction of operative interference. It cannot be denied that the plating of compound fractures will succeed in a certain number of cases, and in rare cases the wound will heal over the plate and no further trouble will be experienced. Sepsis in a mild form need not even be a bar to bone-pegging or bone-transplantation where such a procedure is thought advisable. The bone-graft, if transplanted with periosteum intact, will become inflamed and an involucrum and sequestrum result, in a manner similar to the process seen in cases of osteomyelitis. The experience of the war has also taught that loose fragments of bone at the site of a comminuted fracture in the presence of severe sepsis will very often survive and become consolidated during union. Bad results frequently follow the unnecessary removal of such fragments. In the first place, the opening up of the wound and the removal of bone often give rise to an intense reaction, the temperature reaching 104° and 105° ; and secondly, the depletion of bone round the fracture is quite often followed by non-union. It is generally recognized that for ununited fractures bone-grafting is the operation of choice. Whatever the cause, the defect in the process in osteogenesis is obviously best remedied by the introduction of a bone-graft. Plating, on the other hand, retards osteogenetic powers, and is not likely to succeed in the case of ununited fracture unless there is some local mechanical reason for the non-union. Ununited fractures of the lower third of the tibia in children have often defeated all the resources of surgery, and many authorities come to the conclusion that these cases can only be effectually treated by amputation. The writer has recently obtained union in a boy six years old by the introduction of a bone-graft into a tibia which had resisted all other surgical methods for eighteen months.

Robert Jones¹ writes a most lucid and illuminating paper on the mechanical treatment of compound and suppurating fractures occurring at the seat of war. He builds his methods of treatment on the rock of efficiency and simplicity. He obtains easy and painless access to the wound, and protects the limb from harm during transport. The opinion is strongly expressed that *surgeons should abandon all methods designed to immobilize the fractured ends by operation*. Such methods are fraught with danger and have no place in this campaign. Plaster-of-Paris, so often used in the treatment of simple fractures, becomes a filthy method when suppuration has occurred.

Despite every precaution for the exposure of the wound, the plaster mops up discharges like blotting-paper. Jones urges his young colleagues at the front to *discard plaster-of-Paris altogether*.

Fractures about the hip-joint involving the neck or the shaft just below the trochanter are best treated by extension in the abduction position. No heed need be paid from a practical point of view to the tilting forward or the rotation of the upper fragment. "The alleged disturbing action of the psoas muscle, in my experience, does not occur. This is to be attributed not necessarily to errors of observation on the part of those who report it, but to the fact that, with fixed extension, reflex contractions of muscles do not persist. I do not believe that the desire to contract, unless it is oppressed, is as inherent in muscle as if it were original sin. My whole experience in the treatment of fractures, as in the treatment of such conditions as spastic paralysis, is that if muscles are efficiently controlled they come to rest and cease to struggle, but that if the control is inefficient or intermittent, then reflex action is active, and all muscles enervated from the same region of the cord share more or less in the excitability." Jones's abduction frame fulfils all the requirements of treatment, viz., the abducted position of the limb and fixed extension. (See Vol. 1914, p. 244.) External rotation can be readily corrected with this apparatus by a few strips of adhesive plaster carried round the limb from without inwards and attached to the inner side of the frame. The method secures the lower limb in relation to the pelvis in a manner which can never be achieved by weight and pulley. It is by reflex nervous impulses induced by changes of tension of the muscle that muscular spasm is produced. A patient lying in bed with a fractured femur cannot avoid constantly changing the tension of the muscles of his thigh if a weight and pulley are attached to the limb. Every time he tries to shift the position of his shoulders by digging his elbows into the bed, he alters the tension of his muscles, calling forth a reflex spasm. A spasm is produced when he falls asleep, when he is lifted upon a bed-pan, or moved for purposes of nursing. Jones rightly condemns the long Liston splint, which maintains the limb in malposition, and which must result in angular union. For compound fractures of the hip-joint, the result of bullet or shell wounds, there is no appliance to equal the abduction frame. For all fractures of the shaft of the femur below the trochanter minor—the Thomas knee bed-splint is, according to Jones, incomparably the best. It automatically secures a correct alinement. This splint can be used also with advantage for fractures about the knee-joint, and upper and middle portions of the leg. Its application is quite simple. Strapping is applied to the limb below the fracture in the usual way. The commercial roll of adhesive plaster is best avoided for this purpose; it is expensive and tends to slip. Cheap hospital strapping, fashioned so that almost the entire limb will be encircled, retains its grip and does not require constant attention. At the lower end of the strapping a loop of strong webbing is

stitched: this loop lies just above the malleolus on either side of the ankle. The splint is applied so that the padded ring is firmly pressed against the tuber ischii. A small screw extension at the end of the splint is fastened by a strong cord or bandage to the loops in the strapping, and by adjustment of the screw the required extension can be obtained. Bandages or strapping passed from one side of

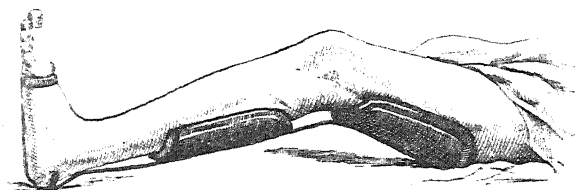


Fig. 21.—Skeleton splint for injuries near ankle-joint.

the splint to the other underneath the limb, in the manner familiar when Hodgson's splint is used, complete the dressing. If necessary, local splints can be employed made from Gooch splinting or from gutter-like sheet-iron, as recommended by Jones. A little attention is necessary to prevent soreness in the perineum. The nurse should

occasionally press down the skin of the buttock and draw a fresh part of the skin under the splint. It is a matter of astonishment that before the war the use of this splint was little known, and yet in the most simple and inexpensive way it fulfils all requirements for the treatment of simple and compound fractures of the femur and upper portion of the leg.

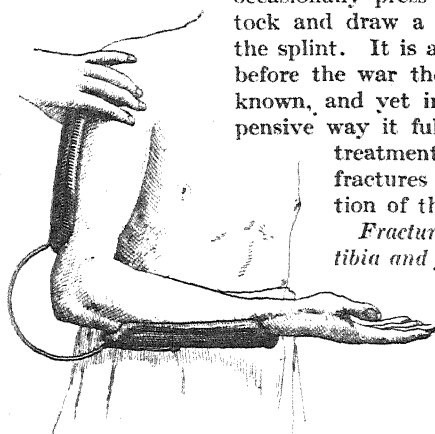


Fig. 22.—Elbow splint applied, allowing access to joint.

Fractures of the lower portion of the tibia and fibula and through the ankle-joint are treated in a skeleton splint, which allows easy access to the wound (Fig. 21). In gunshot wounds, spiral fractures are rare, and one bone usually remains unbroken.

For transport, however,

and for general comfort, the splint should immobilize the knee.

Fractures through the shoulder-joint and through the surgical neck of the humerus require no splints. The elbow should be slung at right angles, and fixed by a broad bandage to the side. The dressings required in compound fractures replace the usual axillary pad. Shoulder shields are cumbrous and unnecessary. So far as possible the patient should be treated in the upright position, with head and shoulders well propped up at night. If there is ground for thinking

that ankylosis will result, the arm should be abducted, tilted slightly forward, and rotated inwards. It is the best possible position for the arm if future movement depends upon the action of the scapula.

Fractures through the elbow or immediately above need no splints. The arm should be kept well flexed, but the acute flexion which gives the best results in children is not possible in adults. Above all, the internal wooden angular splint must be avoided. It is always clumsy, and often causes deformity. If a splint must be used, the one illustrated serves all purposes (*Fig. 22*). Fractures of the shaft of the humerus require frequent dressings and careful handling. Thomas's knee bed-splint, modified as illustrated (*Fig. 23*), for fractures of the arm, is a useful addition to the usual surgical armament. Over-extension must be guarded against, as it may be followed by non-union where the bone is destroyed.

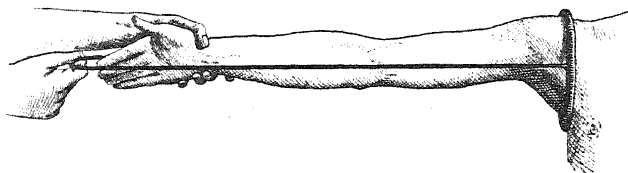


Fig. 22.—Extension arm splint applied. A modification of Thomas's knee splint.

In *fractures of the forearm* the surgeon should anticipate the usual inability to supinate after union. The ulna must be kept straight, and the entire curve of the radius not interfered with. Whether one or both bones be broken, the position of supination should be maintained. In fractures about the wrist and hand, simple or compound, the wrist must be maintained in dorsiflexion; in this way alone can the fingers retain their grasping powers. All wounds about the wrist and all cases of tenosynovitis should be treated in like manner. Jones says, "I have seen several cases of gunshot wounds to the wrist, and they have been mostly treated with the hand in line with the forearm, that is, midway between palmar and dorsiflexion." This is fatal to a useful joint.

Wallace and Maybury² devised a modification of Thomas's knee splint with the idea of producing powerful extension while plating *fractures of the femur or tibia* (*Fig. 24*). It "consists of the original Thomas's crotch ring with a lateral diameter of $9\frac{1}{2}$ in. The two side-pieces are made of mild steel, are parallel, and 8 in. apart. Sliding on these parallel side-pieces are two transverse bars. The upper one is fitted with an ordinary foot-piece. The lower one is perforated to accommodate a large machine-cut screw. The top of the screw runs in a collar in the transverse foot-piece.

The process of application is as follows: The ring is slipped over the foot and adjusted in the ordinary way, care being taken that the inner and back part of the ring gets a bearing on the tuber ischii.

As the ring is rather large, this is ensured by putting a pad on the outer side of the thigh. The foot is then fastened to the foot-piece by a stirrup extension or a leather anklet, or by webbing embedded in plaster put on over wool wrapped round foot and ankle. The limb is supported in the splint by the two parallel bars in the same way that is usual in the Hodgen splint. The lower transverse sliding piece is then fixed to the two parallel bars by screws provided for the purpose, and extension applied to the limb by turning the traction screw. The end of the splint is either rested on sand-bags or swung by a chain from a mast-head or from the roof of the hut. By this means the patient is free to move about in bed within reasonable limits, and the dressing of a posterior wound can be effected without discomfort to the patient by either raising the splint or turning him on one side, the constant steady pull of the screw preventing any undue shifting of the limb and consequent pain to the patient. If the limb tends to sag when the patient is turned on his side, it can be prevented by loops of bandage fastened to the uppermost bar.

"In those cases in which it is impossible to apply the stirrup extension, either because of the state of the skin or from the presence of wounds in the leg, a pin can be driven through the lower end of the femur and the extension applied by a chain or thick picture wire, which runs from one end of the pin down to the transverse foot-piece over two pulleys let into this, and up again to the opposite end of the pin."

C. Max Page advocates the use of *aluminium skeleton splints* in the treatment of compound fractures. The malleability of the material renders splints made from it more adaptable to present conditions than are those of wrought iron. The splint recommended by Page is, like many others, a modified Thomas's knee splint. In addition, an arm splint is described, and it is claimed that these two splints suffice for the treatment of about 80 per cent of the fractures of the extremities. The points in favour of a splint of this modified Thomas type are as follows: (1) The splint can be applied without

an anæsthetic; (2) The slings can be arranged and the side-pieces bent so that any sized wound can be easily dressed; (3) The splint maintains constant fixed extension on the fragments; (4) The patient is free to move his body in any direction.

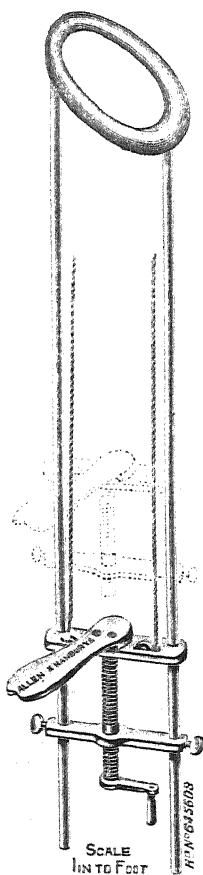


Fig. 24.—Wallace and Maybury's modification of Thomas's knee splint. Shows the method of obtaining extension by means of a pin. Note the wire fastened by rings to the pin and passing over the pulleys in the transverse bar that carries the foot-piece. The traction screw is longer than is now used.

In preparing the splint, "The measurements required are (*a*) from the tuber ischii to the point of the heel; (*b*) an oblique from the tendon of the adductor longus an inch below its origin, passing behind the limb to the upper margin of the great trochanter of the femur."

The splint is made from two U-shaped pieces of aluminium splinting as usually supplied (length 60 in.) (*Fig. 25*). The convexity of one U is bent to form the hip crutch, which will be of the size of measurement (*b*). For manipulating the splinting, a large screw wrench (as supplied with the ambulance carriages) will be found most useful. The other piece of splint is bent symmetrically to form a stirrup. This stirrup should be formed with a slight concavity downwards (not shown in *Fig. 25*), in order to keep the extension strap in place. The crutch of the upper U is padded with tow and covered with jaconet. When the splint is wanted, the two U sections are joined together with aluminium ribbon, so as to give a length from the margin of the crutch to the stirrup of 4 in. to 6 in. more than measurement. Slings of linen or other firm material are then attached to the inner limb of the splint at such levels as to support the leg but not to interfere with dressings (*Fig. 26*). A triple fold of jaconet will be found a useful form of sling near a wound. Fixation of the slings can be effected by safety-pins.

For application of the splint, an ordinary extension attachment is first fixed to the leg. A four-tailed extension bound in place with two or three plaster-of-Paris bandages gives good results. The bandage is carried over the heel and instep as well as the leg; this checks the formation of any pressure sore, and as long as the plaster remains rigid, prevents any give in the extension. The splint is then slipped under the leg

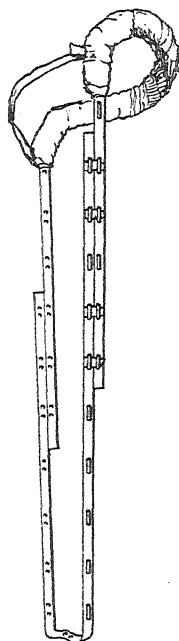


Fig. 25.—Modified Thomas's knee splint. The arches of aluminium ribbon here shown should be replaced by webbing and buckle in the case of the transverse to the crutch, and by fabric slings below.

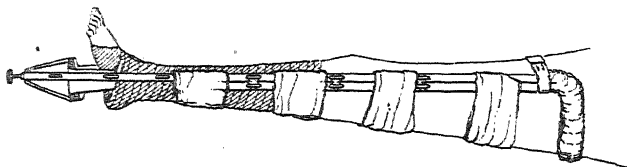


Fig. 26.—The modified knee splint applied.

and the crutch pushed against the tuber ischii; the crutch is moulded to fit the thigh firmly at this level, and then fixed by buckle and webbing passing across in front of the limb. Extension is then

applied by a strap passed from the loop and round the stirrup. The slings are passed under the leg and made fast to the outer limb of the splint with safety-pins, in such a way that the limb lies evenly in the middle of the splint (*Fig. 26*).

Hayes, of Tralee,⁴ contributes another modification of the Thomas splint. The accompanying illustrations show the adaptability and simplicity of his design. He points out that the more elaborate and complicated the modifications of the Thomas splint are, the more they are removed from efficiency. Hayes's splint can be made applicable

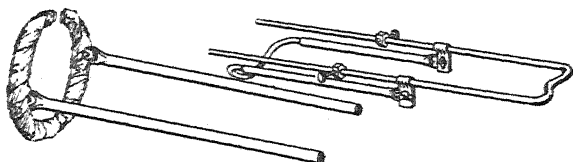


Fig. 27.—Hayes's modification of the Thomas splint.

to any particular case by very simple adjustments. It can be used either on the right or left side, and made adjustable to any sized limb. *Figs. 27, 28* explain its construction, and no elaborate description is needed.

"The truss ring is made of malleable iron, open in front, so that by bringing the open ends together, or separating them, it can be adjusted to the required size. Two tubes are attached to the ring with sufficient play, so that the ring can be altered to any angle required to suit the right or the left side. The lower portion of the splint

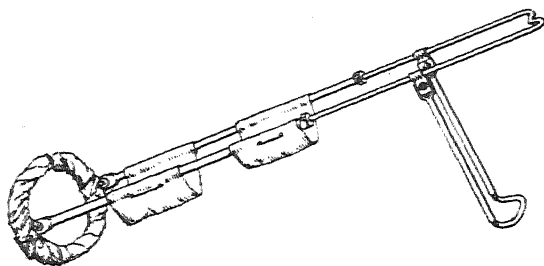


Fig. 28.—Hayes's modification of the Thomas splint.

consists of bent rod iron; the arms of the bent iron are inserted into corresponding tubes, and by simple telescoping can be fixed by a screw in any position required to suit the length of limb. Attached to the lower end of the splint there is a rest, which when turned down raises the limb to any angle required; this will be an advantage in transport, and when not required may be folded up, for it has the shape of the limb and does not interfere with the dressing."

Fractures about the Elbow-joint.—In children, fractures about the elbow-joint are universally treated in the position of hyperflexion, and

excellent results can be thus obtained without the use of any appliance. The elbow is fully flexed and the arm supinated. After a few days of acute flexion, the wrist is slung tightly to the neck by means of a bandage passed through a thick rubber tube, which prevents cutting of the neck with the bandage. Fractures of the lower end of the humerus, with displacement backwards, can be held in excellent position by this method with a little manipulation. The tendon of the triceps acts like a moulded splint, keeping the lower fragment from being displaced backwards. The triceps tendon, furthermore, tightened over the fractured portion, inhibits the formation of excessive callus, and prevents subsequent limitation of extension. In fractures of the internal condyle the natural tendency to displacement forwards and outwards is corrected in flexion by the relaxation of the attached muscles.

T-shaped fractures involving the elbow-joint are likely to be followed by limitation of flexion owing to the excessive formation of callus. The hyperflexed position should be adhered to from the first. Early passive motion in the case of the elbow, as in other joints, should be avoided as part of the treatment. With early movement the injured joint is further inflamed, the formation of excessive callus encouraged, and bad final movement results. Massage and gentle active movement can do no harm if painless. Jones recommends that in the case of the elbow-joint in children the arm should be gently lowered a few inches after a week or ten days have elapsed, and if the child can again actively move it into the hyperflexed position without pain, further extension may be tried until the movements of the joint are free and painless.

If, on the other hand, extension of the joint to a few degrees produces pain and stiffness, the limb must be again put up in hyperflexion for a further period. Probably the only exception to this manner of treatment is fracture of the olecranon, which is either treated in the extended position for the first week, or the fragments are approximated by operation.

Neuhof and Wolf⁵ give the end-results of 100 cases of fracture of the elbow-joint treated by hyperflexion. In this series, fractures were most frequent in children in the tenth year. These writers, contrary to the above opinion, recommend a combination of fixation in hyperflexion with early massage and mobilization. Six of the 100 cases were operated upon, and a perfect result was not obtained in any, and the authors are thus wary about giving indications for operation. It is pointed out that most of the unfortunate results of fracture of the elbow consist in limitation of flexion, and, from this point of view, hyperflexion is also the most desirable position. The result of fracture of the condyles and upper end of the radius, as would be expected, is excellent when treated by this method. Before the elbow is placed in hyperflexion, the displaced fragments should be reduced. This is possible in the great majority of cases. In a small group, accurate reduction was impossible, but the authors say the results of hyper-

flexion combined with early massage and mobilization were perfect in all but one case. By hyperflexion is meant the most acute flexion in which the elbow can be fixed without obliterating the radial pulse. Although in this paper early mobilization and massage are recommended, the authors are not at real variance with those who deprecate early passive movements, since they insist that the treatment must be practically painless. Passive movements cannot easily be harmful if unaccompanied by pain, and excessive callus formation is unlikely to be produced. Furthermore, after each treatment the arm is again fixed in hyperflexion.

The **Plating** of gunshot fractures has given rise to much discussion, and although the writer believes that Robert Jones is right in con-

demning the practice, there are many strong advocates for its adoption. Norman G. Lake⁶ first draws attention to the subject from a purely theoretical standpoint, and deals firstly with the anatomical or mechanical injury, and secondly with the infective or inflammatory injury. The ideal treatment would be one which dealt effectively with each of these factors without interfering with the treatment of the other. He pleads for some method giving a good anatomical result, and deprecates any method of splinting the bone which interferes with the treatment of the concomitant sepsis. He concludes that from the theoretical point of view the internal splint would appear to be the better. It is stated in this paper that the fresh infection of soft tissue produced by a plate is negligible, and that fresh infection of the bone does not occur



Fig. 29.—The Thomas sling in position.

to any appreciable extent. Occasionally, especially in the smaller bones, a septic bone has healed completely over a plate. In the larger number of cases, however, the plates tend to loosen. This loosening does not occur to a degree sufficient to affect the function of the plate until the fragments have become more or less fixed in position (three or four weeks). The ease with which the dressing can be manipulated, and massage applied to the neighbouring joints and soft tissues, can be attained with few other methods of splinting. The most useful type of plate for comminuted fractures is one having two screw-holes fairly close together at each end, and one or two intermediate ones. This enables one to get a firm hold of the many fragments, and also to screw some intervening small fragments into

position. After treatment by this method, if there is much loss of bone substance leading to ununited fracture, Lake introduces bone-grafts. It is often necessary to wait six months for the secondary operation until asepsis is assured.

P. B. Roth⁷ describes a simple method of treating gunshot wounds of the *humerus*. The patient is stripped to the waist, seated on a chair, and all dressings and splints removed. He is then instructed to take hold of the hand of the injured arm with his other hand, and slowly to bend the elbow, raising the hand as near to his neck as possible, with the elbow hanging down. The hand is then fixed in the sling described by Thomas, of Liverpool, as a 'gauge halter' or Thomas sling. To apply this sling, a four-inch flannel bandage, 3 yards long, is knotted fairly closely round the neck, with the two ends hanging down equally. Where these two ends come opposite the upper border of the wrist, the elbow being fixed in the manner described, another knot is made, and one end passed in front of the wrist and one behind it (*Fig. 29*). The wrist is now pushed snugly up against this knot, the end which passed in front is turned up behind, the end which passed behind is turned up in front, and the two are tied above the wrist in a third knot. Dressings are applied to the wound and kept in position by a triangular bandage. The patient is kept propped up with pillows in bed, so as to allow the elbow to hang down. On no account must the comminuted portions of bone be removed at this stage: most of them will heal in, and help in re-forming the shaft. Necrosed fragments can be removed months later without risk of taking away useful bone. The patient's wrist is kept in the sling night and day for five or six weeks until bony union has taken place. When the patient can voluntarily raise his hand in the sling and touch his forehead, it is safe to let him come out of it. The sling must not be removed to obtain a radiogram, the plate being placed between the body and the arm.

REFERENCES.—¹*Brit. Med. Jour.* 1915, i, 101; ²*Lancet*, 1915, i, 323; ³*Brit. Med. Jour.* 1915, i, 839; ⁴*Ibid.* ii, 812; ⁵*Surg. Gyn. and Obst.* 1915, i, 295; ⁶*Brit. Med. Jour.* 1915, ii, 44; ⁷*Lancet*, 1915, i, 599.

FROSTBITE.—TRENCH-FOOT.

J. Ramsay Hunt, M.D.

The terms trench frostbite and trench-foot have been used to describe a condition which was very common at the front during the 1914-15 winter campaign in Northern France and Flanders. Properly speaking it is not frostbite, for many of the cases occurred with the temperature well above frost: nor were the ears and tip of the nose affected as in typical chilblain, and the hands only in very rare instances. The affection is very painful, and was the cause of incapacitating a large number of men engaged in trench warfare. Some idea of the military and economic importance of this malady may be surmised from a reply by Mr. Tennant to a question in the House of Commons to the effect that up to January 24, 1915, the number of casualties in the British Army from frostbite was 9175.

PATHOLOGY.—This is somewhat obscure, the consensus of opinion favouring the theory of a vasomotor constriction accompanied by vascular occlusions and low-grade inflammatory changes. Nearly all authorities agree that it is not merely a neurosis, although in neurotic subjects certain clinical peculiarities may result. According to the severity of involvement, the lesions may vary from slight vasomotor reactions to the severer forms of gangrene, both dry and moist, the latter being relatively rare. The experimental studies of Lorrain Smith, Ritchie, and Dawson¹ are important in this relation. "The observations were made on rabbits. One of the hind feet was shaved, and the animal was then placed in a wide glass cylinder standing on a layer of earth which was kept dry or moist according to requirements. By this means it was found possible to reproduce in the rabbits' feet the œdematous swelling characteristic of trench frostbite. The microscopic examination of the tissues showed that *the chief effect of the cold was on the blood-vessels*. The lumen was dilated and contained a certain amount of fibrin deposit; the endothelium of the intima was swollen: there was vacuolation in the muscle fibres of the media, and there was an increase in the number of cells in the perivascular tissue. The lymphatic vessels were in some cases normal in appearance: in others they were dilated and filled with masses of fibrin, but as a rule the walls were unaltered. In the tissue spaces there was a copious deposit of fibrin in the form of threads and granules; the collagen bundles of the fibrous tissue were separated and swollen, and in areas where the exudate was abundant they were undergoing solution in it. In certain cases, and especially when the œdema had been present for a longer time, there was a diffuse infiltration of the swollen tissue with leucocytes. In cases where the foot had been subjected to warm water after exposure to cold, there was a diffuse infiltration with red corpuscles which here and there amounted to hæmorrhage."

ETIOLOGY.—The condition is produced by standing for long periods of time in wet and muddy trenches, together with the pressure of tight shoes, bandages, puttees, etc., which produce constriction of the blood-vessels and a slowing of the pedal circulation. This, with the cold, exhaustion, lack of sleep, and prolonged nervous strain, are the essential factors in favouring the development of this much-dreaded complication of trench life in winter. Continuous standing in the cold and wet with tight foot-gear has been the usual history in this group of cases. The nutrition does not seem to be a factor of great importance, as most of those afflicted were well nourished. No special racial incidence was observed, and hillmen like the Gurkhas suffered equally with the Sikhs.

SYMPTOMATOLOGY.—The onset of the condition is usually indicated by coldness and numbness of the feet. The toes and dorsum of the foot become insensative, and there is a sensation as of walking on the heels. With these subjective phenomena the feet swell (œdema) and the skin becomes bluish or purple in colour, or sometimes a creamy

white. Later, blisters, blebs, bullæ, and ulcerations may develop, especially on the dorsum of the foot and toes. Massive peeling of the skin often occurs. The hallux is more often affected than the other toes, with the heels and the pressure-points at the base of the hallux and the ball of the little toe. The nails often show hæmorrhages beneath them, and the pressure-points pigmentary changes. In the more severe cases gangrene supervenes, usually of the dry variety, less commonly moist gangrene with general toxic symptoms. The pain is usually severe, and may become atrocious; it is burning and throbbing in character, and is often accompanied by extreme hyperæsthesia of the skin and tenderness of the deeper structures. At times the pain may assume a *neuritic* character, the lancinations shooting into the calf and thigh.

Sensation is always affected, and the anæsthetic areas are most commonly distributed over the dorsal region of the foot. In many of the cases it assumes a stocking or sock form, the line of anæsthesia often terminating just above the base of the metatarsal bones. The anæsthesia is either diffuse, or occurs in more or less circumscribed patches, and does not correspond to the anatomical distribution of a nerve. The hyperæsthesia is often extreme, and deep pressure or movements of the articulations produce severe pain. There is often an inability to move the individual toes, and the extensor tendons of the foot are tense and taut. The hallux is frequently in a position of dorsiflexion. The knee-jerks and Achilles-jerks are always elicitable and the plantar reflex is present, although the latter may be difficult of elicitation in anæsthetic cases. In some there is an elevation of temperature (99° – 100° F.), usually associated with sepsis.

Tetanus occasionally occurs as a complication, as do the dry and moist gangrene. Properly speaking, gangrene is not a complication, but is a type of the severer form of the malady. Thrombosis of the superficial veins of the leg also occurs. Fortunately, gangrene does not appear to be common. In Page's² series of 332 cases, macroscopic gangrene was present in only 5. In this series both feet were involved in all of the cases, but not to an equal extent, and this has been the rule with other observers. In only two of Page's series were the hands affected. It is rather a curious fact that often the condition develops two or three days after leaving the trenches. It also happens that the sufferer has walked six or eight miles to his billet with a well-developed case of trench-foot.

The attempt has been made by some to classify these cases into types, not, however, with great success, as they are often combined and one merges into another. Page recognizes three types: (1) Anæsthesia of the functional type is the prominent feature, and there are no signs to the naked eye; (2) Organic sensory changes are present, with slight œdema; (3) With organic sensory changes there are gross œdema and bleb-formation.

Fearnside³ and Culpin⁴ believe that the gross alterations of sensi-

bility are of the hysterical or psychological type, and are rather inclined to emphasize this neurotic type of the disease as follows: "The symptoms in the second group of cases, where objective signs were scanty and subjective manifestations in excess, coincide with a lay conception of 'frostbite,' and we believe that in the main these manifestations have a mental origin. Gross alterations in sensibility were found only in this class, and the distribution of the sensory changes was similar to those observed in so-called 'hysterical' or 'psychical' anaesthesia." (*See also following article by Dr. Graham Little.*)

PROPHYLAXIS.—This is of paramount importance, and consists in combating the etiological factors, so far as this is possible under modern conditions of warfare in winter. It is of the first importance that the foot-gear be loose and that bandages and puttees should not be wound tightly about the legs, thus avoiding any impediment to the circulation of the lower extremities. The feet should as far as possible be protected from prolonged exposure to wet. To counteract this, a purified suet, camphorated, with 5 per cent eucalyptus oil, and having a low hygroscopic power, has been used with good results. Témoign⁵ has also advocated greasing the feet. Wader stockings and waterproof bags for the feet and legs have also been suggested, and Délépine,⁶ after careful investigation, has devised special oil-silk bags for this purpose. Frequent relief from the rigours and strained positions of trench life are also indicated. Appended is a routine order for the Army, issued November 23, 1914, as a precaution against frostbite:—

"Cold is likely to give rise to frostbite when the circulation of blood is interfered with or rendered feeble. The feet are likely to be frostbitten under the following circumstances: (1) When boots and puttees are too tight; (2) When the general circulation throughout the body is less active than normal; (3) When the socks, boots, and puttees are wet.

"The best precautions are on the following lines: (1) Boots should not fit tightly, but should be at least a size too large. When large boots are worn it is well to wear two pair of socks; but this is dangerous if the boots are small, as it leads to further pressure on the foot. Puttees should never be applied tightly. (2) The general circulation can be kept up by keeping the body warm and dry. A mackintosh sheet worn over the greatcoat is of assistance where no waterproof is available. (3) A dry pair of socks should be carried in the pockets when available. Officers should see that dry standing is provided in the trenches whenever possible by means of drainage, raising of the foot-level by fascines of brushwood or straw with boards on top, or by the use of pumps where these are available."

TREATMENT.—The affected extremities are slightly elevated after being dried with spirit and dusted with boracic acid powder. They are then loosely covered with wool or left exposed, the bedclothes being supported by a cradle. If there is active tissue destruction,

the foot is painted with 2 per cent solution of iodine in spirit. Should dry gangrene appear, the part should be kept wrapped in antiseptic gauze. **Ac. Acetyl Salicylicum** may be given for the relief of pain, and gentle **Massage** is often of benefit. As a substitute for massage, the **Biokinetic** treatment of Jacquet⁷ has been recommended. The essential principle of this method consists of active mobilization of the extremities, in a position of forced elevation, by the patient himself. The congealed limbs are first carefully cleansed with tepid water in which some soap has been dissolved; then, after being carefully wiped, they are slightly moistened with a mixture of equal parts of glycerin and alcohol, to which 5 per cent of formol is added. This lotion, which is renewed every morning and evening, and allowed to dry without being wiped off, has the effect of hardening the epidermis and maintaining it in an antiseptic condition, while it opposes all sources of cutaneous infections by preventing superficial excoriations. The interdigital areas must be cleansed with great care; the toes are then isolated, and each is separately invested with small sterilized compresses. These precautions must be still more minutely observed and carried out when phlyctenulæ have already formed; in such cases the latter should be dressed like burns. At the commencement of the treatment, when the affected extremities are benumbed and stiff—almost as if ankylosed—the patient is asked to carry out only the very simple movements: flexion of the foot, followed by extension; then adduction of the same, followed by abduction; after which these movements are progressively combined. Little by little the articulations regain their flexibility, the movements being increased progressively in force and amplitude. This auto-massage, which is carried out by the performance of the most extended and most energetic possible movements of the articulations of the feet, should always be practised during a period of four or five consecutive minutes, and frequently repeated, say, at least eight or ten times a day. The first clearly definite result which is obtained by this mode of treatment manifests itself by the diminution and even complete cessation of the painful crises.

When gangrene is present, immediate or early amputation is absolutely contra-indicated. Cases of dry gangrene are best left alone. After the line of demarcation forms and the sloughing part is discharged, any projecting portions of bone may be removed. With moist gangrene and toxic absorption, amputation just above the gangrenous area may be required.

A remedy for the treatment of painful frostbite which has been highly recommended by Davis⁸ is cocaine 8 gr., olive oil 4 dr., liq. calcis 4 dr., which simply means linimentum calcis or '**Carron Oil**' and **Cocaine**. A small quantity is rubbed into the feet twice daily, special attention being given to the toes; the feet are massaged with it for a few minutes, and afterwards wrapped up in cotton-wool. It is an improvement to add 1 oz. of liquid paraffin to 4 oz. of carron oil, as by this addition it does not oxidize so

quickly or dry so rapidly. After the oil dries on the feet, the following dusted on is an excellent powder :—

R Camphor	gr. xxxv	Zinc Oxide	
		Pulv. Amyli	āā 3ss

REFERENCES.—¹*Lancet*, 1915, i, 595 ; ²*Ibid.* 590 ; ³*Brit. Med. Jour.* 1915, i, 84 ; ⁴*Ibid.* ; ⁵*Ibid.* 352 ; ⁶*Jour. R.A.M.C.* 1915, May ; ⁷*Med. Press and Circ.* 1915, i, 438 ; ⁸*Brit. Med. Jour.* 1915, i, 545.

Other References are :—A. B. Cottell, *Brit. Med. Jour.* 1914, ii, 992 ; Watson and Myers, *Ibid.* 1915, i, 41 ; Délépine, *Lancet*, 1915, i, 271 ; Loughnane, *Ibid.* 803 ; Mayo Robson, *Ibid.* 117 ; C. Miller, *Ibid.* 801 ; Douglas Powell, *Ibid.* 253 ; Jocelyn Swan, *Proc. Roy. Soc. Med.* 1915, 41.

FROSTBITE. (See also preceding article by Dr. Ramsay Hunt.)

E. Graham Little, M.D., F.R.C.P.

This subject has assumed an importance which renders Fearnside's paper¹ most opportune. Many factors are concerned besides the degree of cold which precedes the injury, and many parts of the body are affected besides the surface ; but the local changes chiefly concern the dermatologist, and are confined to exposed parts, and of these especially the extremities—the hands, feet, ears, nose, and cheeks being the sites most affected. The local changes may result from : (1) Actual freezing of the tissues, a rare phenomenon which in its milder form may be familiar to many practitioners who use carbon-dioxide snow or the ethyl-chloride spray. After thawing, the skin swells considerably, becomes red, blisters, and, if the exposure has been prolonged enough, a section of tissue dies, and separates as a gangrenous mass. (2) The changes are due to an ischæmia, resulting from a general superficial vasoconstriction, in which first the smaller and then the larger arteries are contracted, this stage being succeeded by a vasodilatation, in which the parts become livid, in place of the earlier pallor. A moderate degree of these changes is represented in the well-known symptoms of chilblains. Prolonged action of cold may result in gangrene of a whole limb without actual freezing having at any time been present in the tissue, and to this type the great majority of military cases seen in the trenches belong. The symptoms are insidious, and comprise stiffness, coldness, itching, numbness, and loss of sensibility : never the active pain of tissues recovering from actual freezing : and the victim may become aware of the full extent of the mischief only when he inspects his feet on removing his boots. The mechanical restrictions imposed by these latter play an important part in production. So too do the lack of muscular movement, the long retention of strained postures, and especially the restriction of opportunities of recumbency and sleep. The chief factors in causation may therefore be summed up as "prolonged exposure to relatively small degrees of cold of the lower extremities, encased in tight wet boots, and kept motionless in a dependent position." It is further suggested that immoderate use of bad tobacco may, by the paralysis of the nerve endings which nicotine is known to produce, contribute in no small degree to the effect. The objective manifestations most

frequently met with in actual cases seen a few days after the injury, as for example in soldiers brought to this country from the trenches, are thus described in order of severity.

Skin Changes.—Congestion, chilblains, œdema, blisters, hæmorrhages, pigmentation, desquamation, gangrene. The latter is usually symmetrical.

Deeper Changes.—There is a certain tension of tendons of the foot, evidenced by dorsiflexion of the hallux, hyperextension of the other toes, eversion or inversion of the foot. Trophic changes in joint or skin are uncommon. Reflexes are retained, in most cases, but there may be a sluggish plantar response.

Subjective Manifestations.—These are very variable. The author classifies cases into two groups: one with gross objective changes, such as gangrene, œdema, and hæmorrhages, and few subjective sensations; the other with slight objective changes, and many subjective symptoms, including varying degrees of hyperæsthesia, anæsthesia, insomnia, and neurasthenia. Thus in a large class of cases the neurosis is by far the most urgent factor, and it is a notable observation that convalescence is more rapid with the cases in which the objective rather than the subjective symptoms predominate.

TREATMENT.—This will naturally differ according to the type of injury. Where actual freezing of tissue has taken place, the best 'first aid' is **Friktion** with snow or cold water, and it is inadvisable to admit the patient too soon to a warm atmosphere. Rubbing with **Turpentine and Oil**, or with **Spirit and Soap Liniment**, is useful in early stages, and subsequently the parts are to be kept dry, warm, and aseptic. With cases of the second group, different measures are needed. The lower limbs should be wrapped in wool, raised on some form of inclined plane, and either powdered with a dusting material, such as **Zinc Oxide**, **Boric Acid**, **Dermatol**, or **Iodoform**, or painted with 2 per cent solution of **Iodine in Spirit**. The parts should be protected from pressure, and, if the skin is unbroken, light **Massage** may be applied. Movements of the feet and legs are to be encouraged. A mild **Hot-air Douche** and treatment with **Static Electricity** may give relief. It is important to reassure the patient, and it would be a desirable reform to withdraw the name 'frostbite' from this group of cases, since it is a misnomer, and often gives the victims quite false forebodings. This is especially important in the neurotic group, in the treatment of which isolation, massage, and an optimistic environment are indicated.

As *prophylactic measures* the application of **Camphorated Suet Fat** with 5 per cent **Eucalyptus Oil** is recommended; the soldier should be warned of the importance of the contributory factors: tight wet boots, long-continued dependent position, and immobility of the feet.

REFERENCE.—*Brit. Jour. Derm.* 1915, 33.

FURUNCULOSIS. (See COCCIDIOIDAL GRANULOMA.)

GALL-BLADDER, SURGERY OF.

E. Wyllys Andrews, M.D., F.A.C.S. (Chicago).

Walton¹ describes the operation for *reconstruction of the common bile-duct*. In some of these cases the gall-bladder is either absent or so small that it is valueless for anastomosis. There is an impassable obstruction of the common duct, but no fistula. The important factor is that the duct is dilated, and it is not difficult to form an anastomosis between it and the intestine. In the second group, in addition to the absence of the gall-bladder, and the impassable obstruction, there is a biliary fistula, and hence the patent portion of the duct is of small size, so that the anastomosis is difficult. Two varieties of operations have been performed, in which no attempt is made to reconstruct the common bile-duct. The first is hepatico-duodenostomy or hepaticojejunostomy. A portion of the liver is excised so that a raw surface is presented, which shows the cut ends of several intrahepatic ducts. An opening is then made into the duodenum or other intestine, the edges of which are sutured to the margins of the liver. It is hoped that the bile will pass from the cut duct into the lumen of the intestine. This operation has had little success or popularity. The other type of operation is that of von Stubenrauch, and is an attempt to form a junction between the intestine and the fistula. A loop of jejunum is divided, and the proximal segment impacted into the distal segment laterally. The proximal end of the distal segment is now passed subcutaneously and implanted into the biliary fistula. An objection to this method is, as reported by Sutton, that not only may the fistula not close, but a faecal fistula may be added.

The operations dealing directly with the common bile-duct may be of three varieties: (1) The use of autogenous tissue-grafts; (2) Direct implantation; (3) Indirect implantation.

Our present knowledge of tissue-grafts is such as to lead to the belief that autogenous tissue can alone be used with any chance of success. For this purpose a variety of structures have been used, but the work on these lines appears to have been limited either to dogs or to the cadaver. Giordano and Stropeni and others advocated the use of a portion of vein. The use of the appendix has been suggested by Molineus, who advocates that this viscus should be removed from the patient himself. He has, however, carried out the operation only on the cadaver. If it is important that the appendix should come from the patient himself, the operation would labour under the disadvantage that in many cases the viscus would not be sufficiently healthy to form a suitable duct. Lewis and Davis have made use of portions of transplanted fascia from the abdominal wall to bridge gaps in the common bile-ducts of dogs. At the end of two months the grafts were healthy and formed a satisfactory duct. The operations above described may in the future prove of very considerable value; but at present, in the human body at least, it is difficult to say what is the exact value of such grafts.

PLATE XXIII.

RECONSTRUCTION OF THE COMMON BILE-DUCT WITH A
RUBBER TUBE (WALTON'S OPERATION).

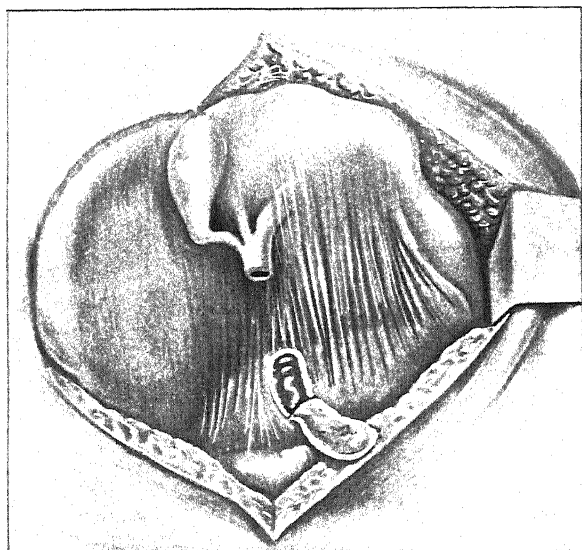


Fig. A.—Showing the duct divided and an opening made into the duodenum.

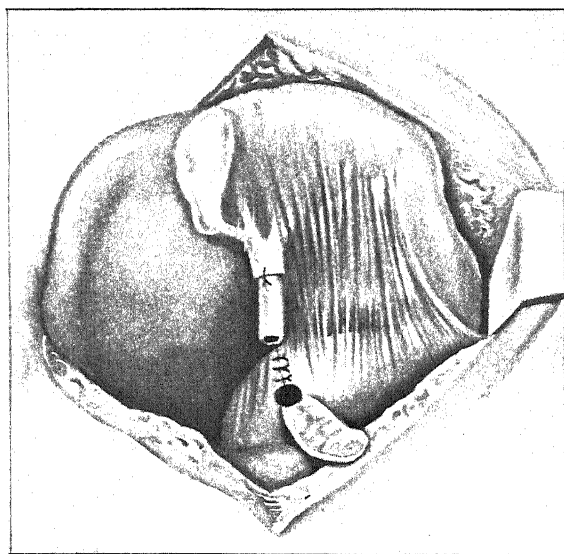


Fig. B.—Tube sutured in the duct; opening in the duodenum partly sutured.

Redrawn from "Surgery, Gynaecology, and Obstetrics"

Walton concludes with a successful case of his own, the result of the implantation of a rubber tube into the end of the common duct, sutured in place with twenty-day chromic catgut—the duodenum being drawn up as close as possible to the cut end of the duct (*Plate XXIII*).

Jacobson² discusses the repair and reconstruction of the bile-ducts. The problem occurs in dealing with accidental injuries during surgical operations, with sloughing of the duct from inflammation, and from secondary contraction causing stenosis, after operations such as for carcinoma of the biliary tracts. The operations necessary for the reconstruction or repair of the bile-ducts may be as follows: (1) Simple suture of a wound in the duct; (2) End-to-end anastomosis of the ducts; (3) Plastic closure of a defect in the duct by omentum, part of the gall-bladder wall, or stomach; (4) Hepaticoduodenostomy, or hepaticogastrostomy, the implantation of the hepatic duct into the duodenum or stomach; (5) Cholecystenterostomy when the gall-bladder is still present; (6) The formation of a new bile-duct by transplanting pieces of veins, hardened arteries, or vermiform appendix; (7) The reconstruction of an entirely new duct, a so-called hepaticoduodenostomy, with a rubber drain tube.

The large bile-ducts have remarkable powers of regeneration. It is this peculiar and apparently special regenerative ability which is utilized in the reconstruction of an old duct or for the formation of an entirely new one.

After a somewhat elaborate discussion, including a table of all recorded cases, the writer summarizes his work in the following conclusions: (1) The possibility of accidental injury to the common and hepatic ducts must not be forgotten in every operation for the removal of the gall-bladder. (2) Such accidents arise owing to the atypical junction of the cystic with the hepatic and common ducts; (3) The larger bile-ducts can be repaired either by simple suture or by end-to-end anastomosis. The anastomosis should allow for drainage for the hepatic ducts. (4) Portions of omentum, pieces of the gall-bladder, and flaps from the stomach have been successfully employed to cover defects in the walls of the ducts. (5) When a sufficient portion of the hepatic duct remains it may be anastomosed into the stomach, duodenum, or small intestine after the method of Witzel. (6) A new common bile-duct may be formed by transplanting a piece of small intestine for the purpose, and where possible this should be the method of choice. (7) Owing to the wonderful regenerative power of the bile-ducts, a complete new duct can be formed by the aid of a rubber tube connecting the remains of the hepatic duct with the stomach, duodenum, or jejunum. (8) While the immediate results of this method are good, the ultimate results are not known; therefore the method should be used only in debilitated patients.

Cignozzi³ discusses the value of cholecystectomy in cases of *simple cholecystitis without stone*. Referring to the traditional idea of drain-

age and removal of calculi from the gall-bladder, the writer insists that many cases have had recurrences because the diseased gall-bladder, with its hypertrophied walls, has not been removed radically. Several instances are reported in which second operations were necessary, and the conclusion is arrived at that where much structural alteration is found in the walls of the gall-bladder, with or without the presence of stone, radical removal is the only means of permanent cure.

Erdmann⁴ reports 270 cases of biliary surgery from the New York Post-graduate School and Hospital. In this series there were 13 deaths—4 per cent. There were 54 cases of acute cholecystitis, 34 gangrenous cholecystitis, 115 chronic cholecystitis, 6 cases showed acute perforation, 6 non-calculous, 4 malignant, 8 simple hydrops, 23 cholangitis, and 6 acute hæmorrhagic pancreatitis, with sloughing and suppuration. Operative methods were 125 cholecystostomies, with 5 deaths; 96 cholecystectomies, with 4 deaths; 5 transduodenal choledochotomy, with 2 deaths; 17 cholecystostomy with choledochotomy, with 1 death; 142 cholecystostomies, with or without combined operation on the ducts, with 6 deaths; 123 cholecystectomies, with and without combined operation on the ducts, with 5 deaths. In 67 cases appendectomy was combined with cholecystostomy. Gastroenterostomy for duodenal ulcer was superadded in 2 cases. Carcinoma of the papilla of Vater was observed once. Typhoidal inflammation, with perforation of the gall-bladder, was recorded 34 times. Hydatids were found in 2 cases. Hæmolytic jaundice was present in 1. Six cases of subphrenic abscess occurred in this series.

Judd⁵ describes the technique of cholecystectomy. The two great dangers in his experience in removing gall-bladders are hæmorrhage from the cystic artery and injury of the common duct. Hæmorrhage may occur during operation, or later from slipping of the ligature. Injury of the common duct has occurred from efforts to clamp the cystic artery, which has slipped from its ligature. Judd advises the cholecystostomy from below upward as being easier, especially in its control of the circulation. The gall-bladder fundus being drawn forward under moderate tension, the neck of the gall-bladder is caught with a second pair of forceps and pulled away from the surface of the liver. The common duct should be easily recognized by this technique. The cystic duct and cystic artery are freed from the surrounding tissues and caught together and divided between two clamps. The artery can then be ligated, without tension or danger of injury, to the common duct. The gall-bladder end of the incision is pulled up under a little tension, thus exposing the peritoneal folds and communicating gut. Before actually removing the gall-bladder, the stump of the cystic artery and cystic duct are now included in one ligature. The still attached bladder is used as a retractor, giving good exposure of the duct and artery. A suture is now begun through the cut peritoneal folds and continued to the edge of the liver, the gall-bladder being removed a little at a time,

and then a few more stitches applied. A small cigarette drain is now placed down to the cystic duct along the fissure from which the gall-bladder was removed in the liver. The writer does not claim originality for this technique, but thinks the important step is the complete freeing of the cystic duct before it is cut.

Todd⁶ discusses *duodenotomy in common-duct stone*, which can be grouped in three types. First, after opening the duodenum the stone may simply be extracted or forced out, the duct not being incised. This should be called duodenotomy rather than choledochotomy. Secondly, the stone, which is impacted in the ampulla, may be freed by a small incision of its strictured orifice, too small to require a suture. Thirdly, the stone may be large and require a considerable incision for removal, which must then be reunited with suture of the duct. Kehr is reported as having operated through the duodenum 29 times in 2000 operations for gall-stones. It is obvious that those most experienced in gall-stone work have resorted to this technique rarely. Thus, Mayo reports 6 cases, Mayo Robson 21, Moynihan, 10 up to 1908. After an historical report from various clinics in the world, Todd adds 9 cases in which he resorted to this method in his own practice. He concludes that duodenotomy is a safe and rational method of removing stones from the ampulla of Vater, and is much easier than choledochotomy when the stones are located low down. His series of nine cases gave one death, which is a lower mortality than he attained in thirty other cases by the old method.

REFERENCES.—¹ *Surg. Gyn. and Obst.* 1915, ii, 269; ² *Amer. Jour. Obst.* 1914, ii, 948; ³ *Policlinico (sez. chir.)*, 1914, 405; ⁴ *Ann. Surg.* 1914, ii, 665; ⁵ *Ibid.* 1915, i, 306; ⁶ *Ibid.* 180.

GALL-STONES.

The use of X-rays in diagnosis discussed (p. 51).

GANGRENE.

(Vol. 1915, p. 283.)

GASTRIC ANALYSIS. (See also Vol. 1915, p. 286.)

O. C. Gruner, M.D.

Gastric Analysis.—Skaller¹ advocates an hourly investigation of the gastric contents, by using a special tube which can be left in continuously. The object is to avoid the fallacy arising from the food not necessarily forming a homogeneous mixture. If stratification should arise, each stratum of food may have a different degree of acidity. Another defect of the ordinary test meal is that no clue is obtained as to motor function, and as to the amount of mucus produced. A special meal is given, composed of 0.5 gram Liebig extract in 200 c.c. water, with 25 drops of phenolphthalein. A specimen is withdrawn every five minutes until the phenolphthalein fails to react. This point indicates when the test fluid has left the stomach. The presence of mucus is easily ascertained in the extract.

The type of result obtained is shown in the charts (Figs. 30-32),

Vincent Lyon² found that fragments of gastric mucosa often pass through the tube in washing out the stomach, and may be studied by centrifuging such material and cutting sections in paraffin. The fragments of tissue include the mucosa and the submucosa. A

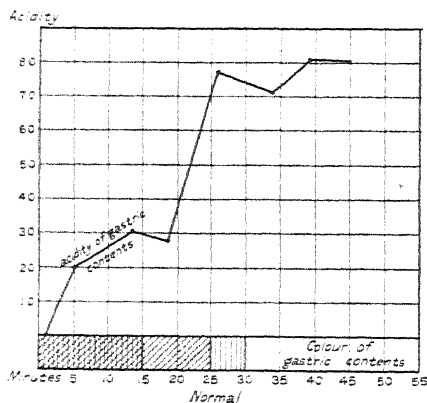


Fig. 30.

specially slender tube is employed, and is left *in situ* for several hours. The washings are sedimented, fixed in formalin, and embedded and cut in the usual way. This writer has found the method to be of value in the diagnosis of cancer, as actual tissue fragments may be

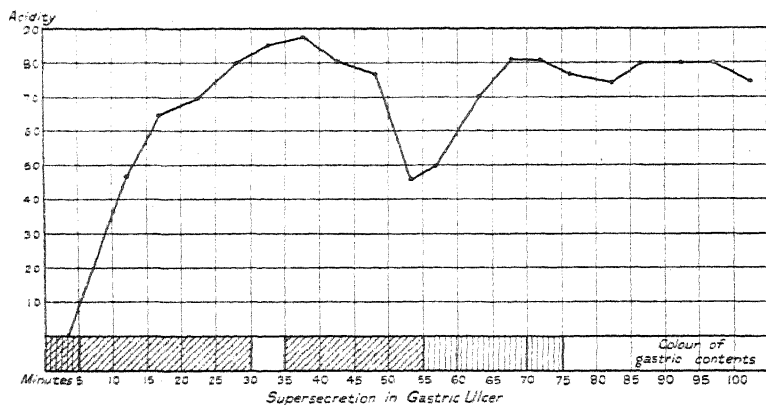


Fig. 31.

recovered in this way at an early stage. Repeatedly negative results form a strong argument against the presence of this disease. [The findings would need to be interpreted with caution, for errors might easily arise, as a result of artificial influences on such fragments of

tissue. Further, inflammatory processes may be localized, and not reached by the method of investigation.—O. C. G.]

Oppler-Boas Bacilli.—Chambers³ has made a study of these organisms, otherwise known as lactic-acid bacilli. They are non-motile, non-sporing rods, which retain the stain by Gram's method. Lugol solution turns them brown, whereas *Leptothrix buccalis* gives blue with this reagent. The organism clots milk, turns it acid (lactic acid), and ferments sugars. Possibly it is the absence of HCl in the

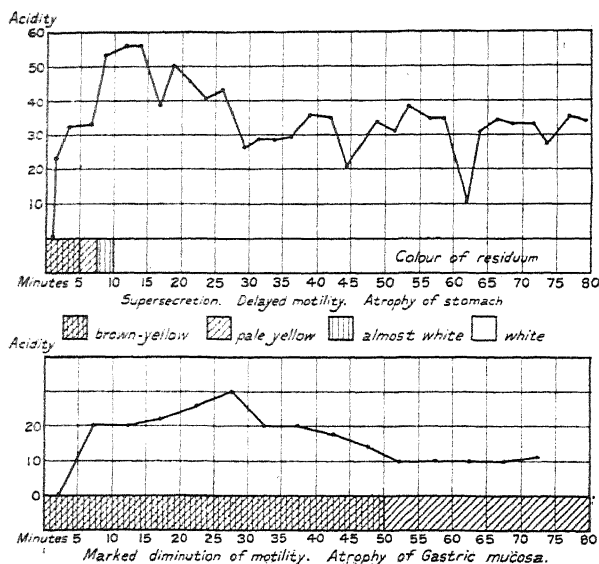


Fig. 32.

Figs. 30-32.—The curves represent the progressive variations in the acidity of the gastric contents. The shaded spaces on the horizontal line indicate the duration of the stay of the food (broth) in the stomach. A white gastric extract indicates that the meal has entirely passed into the duodenum. Each chart therefore shows the activity of the gastric glands, as well as the motility of the stomach.

juice that allows them to flourish. More than 70 per cent of the cases in which these organisms are found are cases of cancer.

Friedman⁴ attempts to distinguish between gastric and duodenal ulcer by means of a study of the differential blood-count. [The method may be dismissed as illogical, because the character of the changes recorded can equally well be the result of functional variations within the normal physiological range. It is possible that a pyloric lesion might interfere with reflex lymphocytosis.—O. C. G.]

REFERENCES.—¹Berl. klin. Woch. 1915, 105; ²Amer. Jour. Med. Sci. 1915, i, 402; ³Canad. Med. Assoc. Jour. 1915, 201; ⁴Amer. Jour. Med. Sci. 1914, ii, 540.

GASTRIC AND DUODENAL ULCERS. (*See also STOMACH, ULCER OF.*)*Robert Hutchison, M.D., F.R.C.P.*

Sippy¹ has evolved what he regards as a satisfactory method of curing gastric and duodenal ulcers even when of long standing. It is based upon the generally accepted belief that it is the acid of the gastric juice which interferes with the healing of ulcers.

"The principle involved in the treatment advocated consists essentially in efficiently shielding the ulcer from the corrosive effect of the gastric juice. This is accomplished by maintaining an accurate neutralization of all free hydrochloric acid, thus rendering the digestive action of the gastric juice inert from 7 a.m. until about 10.30 p.m., or during the entire time that food and the accompanying secretion are present in the stomach. In addition, it is accurately determined whether an excessive night secretion is present. If so, this is removed each night until the irritability of the gastric glands has subsided. This applies almost entirely to cases of duodenal and pyloric ulcer that have been associated with stagnation of food and secretion for one or two months, and longer. Such cases almost invariably are attended by a more or less copious continued secretion during the night, which should be removed by aspiration two or three times each night, if necessary. Usually, after three or four days of accurate control of free acidity the excessive night secretion disappears. Subsequently the normal quantity (about 10 c.c.) of gastric juice present in the stomach during the night is left undisturbed."

The neutralization of the acid is brought about by frequent feedings and the use of **Alkalies** in regulated quantities. The patient remains in bed for three or four weeks on the following **Diet** :—

"Three ounces of a mixture of equal parts milk and cream are given every hour from 7 a.m. until 7 p.m. After two or three days soft eggs and well-cooked cereals are gradually added, until at the end of about ten days the patient is receiving approximately the following nourishment : three ounces of the milk and cream mixture every hour from 7 a.m. until 7 p.m. In addition, three soft eggs, one at a time, and nine ounces of a cereal, three ounces at one feeding, may be given each day. The cereal is measured after it is prepared.

"Cream soups of various kinds, vegetable purées and other soft foods, may be substituted now and then, as desired. The total bulk at any one feeding while food is taken every hour should not exceed six ounces. Many of the feedings will not equal that quantity. The patient should be weighed. If desired, a sufficient quantity of food may be given to cause a gain of two or three pounds each week.

"A large variety of soft and palatable foods may be used, such as jellies, marmalades, custards, creams, etc. The basis of the diet, however, should be milk, cream, eggs, cereals, and vegetable purées.

"The acidity is more easily controlled by feeding every hour and giving the alkalies midway between feedings. The acidity may, however, be controlled by feeding every two, three, and four hours.

"Cases of stomach ulcer unassociated with stagnation of food and

secretion are usually controlled by feeding every hour and giving a powder containing 10 gr. each of heavy calcined magnesia and sodium bicarbonate, alternating with a powder containing 10 gr. of bismuth subcarbonate and 20 or 30 gr. of sodium bicarbonate, midway between feedings. Cases of pyloric and duodenal ulcer that have been associated with stagnation of food and secretion longer than two months almost invariably require larger quantities of alkalis.

"In a few cases of duodenal ulcer with high-grade obstruction it has required the equivalent of 100 gr. of sodium bicarbonate every hour, midway between feedings, and three doses with intervals of one half hour after the last feeding, at 7 or 8 p.m., to neutralize all the free hydrochloric acidity."

The author of this treatment claims a very great measure of success for it, even in cases of ulcer which have led to some pyloric obstruction, and he evidently hopes that it may largely supersede surgical methods.

Blumer² gives his experience of the relative advantages of the Leube and Lenhartz methods of treating ulcer cases. His conclusions are based upon a rather small material, but he considers that the Lenhartz plan is more suitable in duodenal than in gastric cases. He sums up with the following judicious remarks:—

"It seems safe to assume that certain types of peptic ulcer show a strong natural tendency to heal if given a fair chance. Ulcers near the pylorus tend to heal badly, while bleeding ulcers, for reasons not entirely clear, seem to heal unusually well. Many ulcers would doubtless heal on the all-important complete rest, plus any of the dietary regimens that have been discussed. Others would equally certainly fail to heal under any form of medical treatment. Originators of diets are apt to adhere too closely to those diets, and tend to become prejudiced against different, but equally efficacious ones. The practitioner, whose sole purpose is to cure his patients, and who need not be distracted from this by attempts to glorify the products of his own cortical cells, should realize that there are good points in all of the diets presented. Each has its advantages and each its drawbacks, and the wise physician is he who will use them as frameworks to be clothed with a dietary structure suitable to the needs of each individual patient."

Joslin³ reports upon the results of treatment in 213 cases of gastric and duodenal ulcer followed for a number of years. His conclusion is that medical treatment cures only about 24 per cent of ulcer cases, and many of these relapse later; surgery helps out medicine, and adds another 15 per cent to those cured. In other words, medicine and surgery together gave back complete health to 39 per cent of 213 ulcer patients seen by him in the last sixteen years.

Veeder⁴ reports on five cases of *duodenal ulcer in infancy*. All were below the age of six months, and four proved fatal. The condition is undoubtedly very rare in early life, and Holt⁵ was only able to find 91 recorded cases in the first year. Owing to the absence of subjective symptoms diagnosis is difficult, and profuse hæmorrhage

from the bowel is often the only sign upon which a diagnosis can be based. Most of the affected infants appear to have been marasmic, and vomiting is a common symptom; it may have the characters of the vomiting of pyloric stenosis. The prognosis must be regarded as unfavourable, and the possibility of surgical treatment is usually excluded by the infant's general condition. The pathology of duodenal ulcer in infancy is obscure. The lesions may be single or multiple, and may take the form either of small superficial erosions or of 'punched-out' ulcers of some size. Whether the relationship of the ulceration to nutritional disorder is one of cause or result is uncertain.

See also Vol. 1915, p. 286.

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1915, i, 1625; ²*Johns Hop. Hosp. Bull.* 1915, 127; ³*Jour. Amer. Med. Assoc.* 1914, ii, 1836; ⁴*Amer. Jour. Med. Sci.* 1914, ii, 709; ⁵*Amer. Jour. Dis. Childr.* 1913, vi, 381.

GENERAL PARALYSIS. (*See also* SYPHILIS, CEREBROSPINAL.)

Bedford Pierce, M.D., F.R.C.P.

In the Croonian Lectures on "Modern Aspects of Certain Problems in the Pathology of Mental Disorders," Edwin Goodall¹ gives a valuable review of the present state of our knowledge in reference to general paralysis and the significance of the Wassermann reaction. He considers that none of the lesions of general paralysis may be considered as pathognomonic, yet taken together, they form a characteristic whole. "To the naked eye the combination of the indications of long-standing leptomeningitis, especially pronounced over the frontoparietal area, of cortical erosions, of wasting of the prefrontal gyri, and granularity of the ependyma of the ventricles, is characteristic." In discussing the relationship between cerebral lues and dementia paralytica, he quotes Henschen as stating that 17·85 of syphilitic patients present tertiary lesions in the brain, whilst only 4 to 5 per cent develop general paralysis; also von Pilez, who states that of 116 cases of cerebrospinal lues only two became general paralytics. Whilst admitting that in some cases it may be impossible to differentiate the two conditions, he considers that clinical, anatomical, and histological evidence points strongly to the conclusion that some additional factor other than syphilis is present in general paralysis.

Evidence of neuropathic inheritance in general paralysis is abundant. Naecke gives 50 per cent, Schroeder 77 per cent, and several other authorities are quoted giving 50 to 70 per cent. Goodall refers particularly to Naecke's statements that internal and external stigmata are more frequent, grave, and widespread in general paralytics than in normal persons, and that the brain in this disease is congenitally defective. With reference to the frequency with which general paralysis occurs in syphilitic patients, Pilez is quoted as reporting 4·7 per cent of cases amongst 4134 army officers. Statistics as to the importance of neurotic inheritance in general paralysis will, however, be of little value until similar inquiries are made in a corresponding number of healthy persons.

With reference to the frequency with which spirochætes can be found in the cortex of the brain, Goodall shows that they can but rarely be demonstrated in long-standing cases. Noguchi found them in 25 per cent of 200 cases; but in the Cardiff laboratory the examination of the brain by modern methods in eight long-standing cases yielded negative results. The cultivation of spirochætes obtained from the brains of general paralytics is a most difficult matter, and the results reported are conflicting.

Goodall also referred to the suggestion that general paralysis depends upon a special variety of spirochæte with affinities for the nervous system. The existence of a *lues nervosa* is inferred from the infrequency with which syphilis is followed by general paralysis, the mild character of the antecedent disease, and the difficulties presented by inoculation with this organism compared with the organism in ordinary syphilis. Moerchen is quoted as reporting the occurrence of general paralysis in eleven men through infection from a single woman; also cases of conjugal general paralysis are referred to, in support of the view that this disease is due to a special kind of organism. Goodall does not, however, express any decided opinion on this subject.

Gregg² discusses the reason why so few persons who have suffered from syphilis succumb to general paralysis, and suggests that only a certain type of individual is susceptible to syphilis of the nervous system. He investigated 100 cases of general paralysis which had given positive reaction to the Wassermann test, and found that 83 were representatives of northern races and 17 of southern, and he suggested that the former are carnivorous in type and the latter herbivorous. No particulars are given to justify any conclusion as to which of these races are most susceptible to infection; nor is the relative population of the various races in the districts affected given.

Mott³ has found spirochætes in 66 out of 100 brains examined post mortem in which the clinical history pointed to general paralysis. He found the most satisfactory method was to make an emulsion from the cortex of the brain, choosing selected regions, "by rubbing up in a glass mortar a little scraping of the grey matter with normal saline or Ringer's fluid," and examining it with dark-ground illumination. Recent cases without much cortical wasting yielded the most satisfactory results. The organisms seem to occur in small foci which may be quite near an area which has given negative results.

In discussing the question whether the spirochætes in general paralysis have undergone some biological change from those in syphilis, Mott points out that inoculation experiments with active organisms from brains in general paralysis in rabbits and monkeys have been negative, while similar inoculation from material of tertiary syphilis is generally positive. Moreover, no cases have been recorded of inoculation through handling the fresh brains of general paralytics. It has been suggested that the spirochætes are biologically modified by treatment with mercury or salvarsan, or that the tissues of the

body have been modified, so that they react differently. The view is taken that in tabes the lesions in the cord are produced by toxins generated outside the nervous system which ascend in the lymphatic and perivascular spaces along the nerve-trunks. This has been experimentally demonstrated by Orr and Rows to occur in other toxic conditions. Mott suggests that in tabes the spirochaetes themselves do not actually reach the nervous system, whereas in general paralysis they are always present within the parenchyma of the brain, and produce diffuse meningo-encephalitis with rapid destruction of nervous elements. In the cerebrospinal fluid there are no protein or leucocytes, and consequently invading organisms flourish through the absence of the natural defences. At the same time, mercury and arsenic, and especially substances of complex molecular structure such as salvarsan, are unable to pass the choroid plexus into the cerebrospinal fluid. It is probable that the failure of treatment is correlated to these facts.

The course of general paralysis is probably related to the invasion of spirochaetes in the following manner. The early symptoms—excitement and convulsive seizures—are due to the inflammatory reaction produced by toxins; but this reaction in turn leads to the production and release of antibodies which cause destruction of the spirochaetes. In this way the characteristic remissions may be explained; but in almost every case there are spirochaetes which resist or become immune, and these multiply later and relapse occurs, accompanied by a fresh outburst of irritative phenomena. It is probable that there is always some destruction of neuronic elements, so that during the remission some degree of mental deterioration is to be expected.

The value of the Wassermann reaction in the diagnosis of general paralysis has been carefully investigated by Goodall. In the cerebrospinal fluid the reaction to a large extent depends upon the presence of lymphocytes. Consequently, when these have been removed by the centrifuge, the percentage of positive results is reduced. In the serum the reaction was positive in 56.4 per cent, negative in 25.6 per cent, and retarded in 18 per cent. In centrifugalized cerebrospinal fluid it was positive in 30.7 per cent, negative in 48.7 per cent, and retarded in 20.5 per cent. These results are much lower than recorded by many other observers; thus several are given in the table published by Goodall, in which the percentage of positive results was 100 in both the serum and the cerebrospinal fluid.

Goodall and Schölberg⁴ also investigated the effect of increasing the amount of amboceptor, and found that the percentage of positive results was increased. In the London County Council Laboratory, Mott⁵ reports the following results as to the value of the Wassermann reaction: Positive in cases confirmed as general paralysis at autopsy, 270; negative in cases confirmed as general paralysis at autopsy, 5; negative in cases shown not to be general paralysis, 52. Thus the percentage of accurate results was 98.4. Goodall also states that

the Nonne-Apelt test is undoubtedly more sensitive than the Wassermann reaction in general paralysis, and is obtained more constantly throughout the disease. It is also more reliable in revealing the presence of the disease during remissions. On the other hand, it is of less value in diagnosis, occurring oftener in cases of insanity which are neither general paralysis nor cerebrospinal lues.

In summing up the conclusions of authorities as to the action of salvarsan, Mott states: "The evidence so far seems to show that we obtain by salvarsan the death of the spirochaetes if the drug has the opportunity of coming in contact with them, and when followed by the stimulating effect of mercury, introduced either by inunction or intramuscular injection, the immunity reactions of the body are increased and the cure is maintained. These are the two therapeutic principles underlying the modern treatment of syphilis, and in the intensive treatment these conditions are fulfilled."

The treatment of general paralysis by salvarsan and neosalvarsan, either intravenously or intrathecally, has not, however, met with any measure of success. Mott states that in one case in which very large doses of salvarsan were administered, the spirochaetes found in the brain were exceptionally numerous, and he states plainly that he does not think any methods of treatment hitherto employed have been successful.

In the discussion which followed the reading of Mott's paper, McIntosh stated that the reason why salvarsan was useless in general paralysis was not the failure of the drug to be excreted by the choroid plexus, but rather the great toxicity of salvarsan, which prevented the administration of a large enough dose. He confirmed the opinion that intrathecal injections of salvarsanized serum are not likely to be of value.

REFERENCES.—¹*Lancet*, 1914, ii, 1287; ²*Boston Med. and Surg. Jour.* 1915, p. 519; ³*Jour. Ment. Sci.* 1915, 190; ⁴*Lancet*, 1914, ii, p. 1454; ⁵*Jour. Ment. Sci.* 1915, 190; ⁶*Ibid.* 193.

GLANDULAR FEVER, ENDEMIC, OF QUEENSLAND.

Sir Leonard Rogers, M.D., F.R.C.S.

A. Brein, H. Priestley, and J. W. Fielding¹ define this as an acute disease, characterized by an irregular remittent fever of from three days to three weeks' duration, accompanied by painless swelling of certain groups of superficial lymphatic glands, and by the appearance of a macular, or occasionally vesicular, rash. The disease has been known since 1877, and existed among the aboriginal inhabitants. The latent period is six days, but it may extend to ten days. The temperature may rise suddenly or gradually, but without rigors. The pulse is rather slow. The axillary, inguinal, and sometimes the cervical glands are enlarged to the size of a marble or of a walnut, are hard, and do not suppurate. The rash consists of copper-coloured macules surrounded by erythema, or rarely it is vesicular. It fades after about two days without desquamation. Most patients are restless and a few drowsy, which condition deepens to coma in fatal cases. In

general appearance the cases resemble typhoid without the abdominal symptoms. The mortality is only 1 per cent. No organisms could be found in or grown from the blood or glands. The blood only shows slight increase of the leucocytes with lymphocytosis. Two monkeys inoculated with the blood of a case developed fever after nine and ten days, with slight enlargement of the glands. Men working near scrub jungle are most affected. The disease is not contagious, but probably insect-borne.

REFERENCE.—¹*Jour. Trop. Med. and Hyg.* 1915, Feb., 30.

GLAUCOMA.

A. Hugh Thompson, M.D.

The reaction which inevitably follows the widespread adoption of any new therapeutic measure as soon as unsuccessful cases begin to be recorded, now shows signs of setting in with regard to the operation of **Trephining** for glaucoma. One hears of ophthalmic surgeons who, after trying it, have gone back to the older operation of **Iridectomy**. Harrison Butler, in an article entitled "The Tragedy of Sclerostomy,"¹ records eight examples of late infection, mostly after Holth's punch operation. It is, however, a peril, he says, which, like the sword of Damocles, hangs over every eye which possesses a filtering cicatrix of any type, however obtained. De Schweinitz² has never seen a purulent infection, either early or late, after trephining, in any patient of his own, but has seen an infection four or six weeks after trephining at the hands of another surgeon. Iritis after trephining occurs, he says, with irritating frequency. It appears either as a quiet iritis with almost no signs of inflammation of the uveal tract, but with the gradual development of soft synechiae, or as a sharp ordinary plastic iritis occurring at any time after the operation. Summarizing his experience, he prefers iridectomy to trephining in acute glaucoma, but in chronic non-inflammatory glaucoma he is still convinced that trephining is the safer procedure. It is not a wise operation where glaucoma is complicated with cataract; but in cases where glaucoma is secondary to cataract extraction, it should be thought of, and in most cases practised. In cases of absolute glaucoma it may be performed as an alternative to enucleation. In secondary glaucoma it may be tried, but the outlook is not brilliant.

Elliot himself, answering his critics on the subject of late infection,³ remarks that there would seem to be a tendency to forget that during the last four years an enormous number of eyes have been trephined, and that the condition for which this operation is undertaken is a very desperate one, that many operators are still new to the method, and that other methods besides trephining are frequently followed by failure. The two conditions which he thinks are most likely to predispose to late infection are: (1) The persistence of a leaking 'fistulette,' somewhere along the line of the conjunctival incision: this can speedily be closed by touching the spot with a 2 per cent solution of nitrate of silver on a swab; (2) The presence of a thin vesicular filtration scar. This is due to faulty technique in fashion-

ing the conjunctival flap (cf. articles on glaucoma in *MEDICAL ANNUAL*, 1913, 1914, and 1915). Only in the centre of the area of the flap should the dissection be carried down as far as the limbus, but here the sclera should be laid bare, the flap being formed by the whole thickness of the conjunctiva. The other points insisted upon by Elliot are now fairly well known, especially the splitting of the cornea in order that the hole may be well forward and away from the ciliary body. Regarding the size of the trephine hole, after hesitating for some time between one of 1.5 mm. diameter and one of 2.0 mm., Elliot now always uses one of 2.0 mm. in order to have comfortable room to introduce the iris forceps. The final size of the hole, however, should vary according to the needs of the case. One of inflammatory glaucoma requires a larger permanent opening than one of the non-inflammatory type. In the latter case the whole of the 2 mm. disc need not be cut off, but only a third, a half, or two-thirds, as the case may be. To render this easy, in using the trephine the corneal margin should be cut through before the scleral, so that the disc may be left attached on its scleral side and dealt with by scissors. It is most important to avoid the entanglement of uveal tissue in the hole, and this is a principal reason for making it far forward.

With regard to the 'quiet iritis' which Elliot admits to be a not uncommon complication of trephining operations, he explains it thus: For a time after the operation there is no anterior chamber; neither is there any posterior chamber; i.e., the iris lies in direct contact with the lens capsule. The fluid secreted after the operation is 'probably' of such a nature as to render the deposition of fibrin from it more likely to occur, and if the pupil is allowed to remain contracted, synechiæ are only too likely to be formed. "The practical lesson to be learnt is that atropine should be freely exhibited from the second or third day after operation onward, until all tendency to the formation of synechiæ has ceased." More serious cases of iritis are attributed by Elliot to septic infection, either pre-existing or occurring at the operation.

A new idea in the treatment of glaucoma is broached by Tristaino, of Palermo.⁴ The modern method of therapy concerns itself entirely with the difficulty of elimination. **Chloride of Calcium** is a drug which is found experimentally to diminish secretion, and in employing this drug in certain cases of glaucoma, chiefly secondary, where ordinary methods of treatment have failed or where operative treatment is declined, this writer claims a certain amount of success. The drug was administered in 3-gram doses.

REFERENCES.—¹*Ophthalmoscope*, 1915, 370; ²*Ther. Gaz.* 1914, Nov. 15; ³*Lancet*, 1914, ii, 842; ⁴*Archiv. di Ottalmol.* xxii (*Ophth. Rev.* 1914, 211).

GOITRE, ENDEMIC.

Herbert French, M.D., F.R.C.P.

ETIOLOGY.—Within recent years the many theories as to the causation of 'simple' endemic goitre have been narrowed down to those which attribute it to chemical ingredients of drinking water, to geological peculiarities of the soil imparting to the water a specific

colloid poison, to faults of nutrition, and to living micro-organisms and toxins derived from them. Soil and locality play a very important part in the distribution of simple goitre—'Derbyshire neck'; stronger and stronger evidence is accumulating, however, in favour of the view that it is not the soil primarily, but infection of the water in the soil by faecal micro-organisms, that is the essential cause of the disease and of its distribution. It is not a malady of sanitary cities with a pure water supply, but of country places or small towns and of agricultural districts with a water supply contaminated during percolation through porous soils. Hence also its liability to attack several members of the same family or household. A great deal of light has been thrown upon the subject of recent years, particularly by McCarrison,¹ from whom we quote freely.

"The extent to which goitre prevails in European countries generally, and in the East, is seldom appreciated. In France, Germany, Austria, Switzerland, and Italy large numbers of conscripts are annually exempted from military service on account of goitre. Baillarger estimated that, about the year 1874, there were in France alone no less than half a million goitrous persons and 122,700 cretins and cretinous idiots. The disease is probably less prevalent nowadays than formerly, but it still gives rise to an immense amount of disability in almost every country in Europe. In India, at the present time, not less than five million persons are afflicted with goitre, while half a million is a low estimate of the numbers who suffer from its congenital manifestations. In endemic localities, goitre may be met with in domestic animals and birds, and in artificially-bred fish, especially in trout. In animals living in the wild state the disease is infinitely less common, and is generally to be found only in those whose habits of life have to a considerable extent been modified by the vicinity of man and his domestic animals.

"Endemic goitre is widely distributed over the whole world. Few countries appear to be entirely free from it. It is so common in certain parts of England and Scotland as to be distinguished by the names 'Derbyshire neck' and 'Nithsdale neck.' It is most prevalent in temperate and subtropical zones. It is found, however, in regions of great cold, as in parts of Siberia, Finland, and in the Hudson Bay Territory of North America. It occurs also in regions of great heat, as in tropical South America, Borneo, Sumatra, Java, India, and Ceylon. While, therefore, temperate and subtropical climates are more favourable to its development, neither great heat nor great cold excludes its occurrence. Its association with mountainous regions is one of its most striking peculiarities, but it is not confined to them. The marked association of goitre with rivers, canals, and irrigated or marshy tracts is another noteworthy feature of its distribution. It is found at all heights above sea-level where man can live and cultivate the ground. It is not absent from the sea-coast, as is often erroneously stated.

"Goitre exhibits a definite seasonal prevalence, which is generally constant for any given place, but may vary in different localities. In

certain parts of Himalayan India which are not reached by the monsoon, new cases of goitre arise and enlargements of pre-existing goitres take place during the spring and, less commonly, during the autumn months. At other seasons of the year it is much less liable to develop. In Himalayan localities which are reached by the monsoon, the rainy season is especially favourable to the development of the disease. In European countries, where endemic goitre is supposed to originate most commonly in the months of March, April, May, and June, the disease is sometimes called 'summer goitre' or 'goitre aigu.' Many examples of so-called 'epidemics' of goitre occurring at this season are to be met with in the literature.

"The most striking feature of these 'epidemics' is that they arise only in endemic centres, in the neighbourhood of such centres, or in localities where the disease has previously been prevalent. They occur usually amongst susceptible newcomers to an endemic area; consequently, school children and young soldiers, especially if they are living in badly ventilated or unhygienic schools and barracks, are especially liable to be attacked. There is no essential difference between epidemic and endemic goitre.

"The endemic prevails especially in rural districts. In some countries the endemicity is very high; in others it is so widely spread over the whole country, while at the same time it is so slight, that it easily escapes notice, and cases of goitre are often considered to be sporadic which should more correctly be classed as endemic. Thus, while the degree of endemicity varies, it would be difficult to declare any area to be wholly goitre-free. In any locality in which the endemic is well marked, as in the Alps and Himalayas, it will be found that it prevails with widely different degrees of intensity in villages situated adjacent to one another. Even in a goitrous village, occupants of certain houses, groups of houses, or institutions may escape the disease, or suffer from it in such slight degree that it is not noticeable. This limitation of the malady to certain places is well brought out by recent experimental and epidemiological work, which has demonstrated the great importance of room, house, or place infection in the genesis of goitre."

McCarrison's extensive and painstaking researches have shown that, besides place or soil in their purely geographical and geological respects, some other common factor underlies the causation of goitre, namely, *dirt contamination* of the soil, or water, or both. The bacteriology of the condition has been elucidated by cultural investigations upon the faeces of affected persons. "The organisms which are capable of causing simple goitre live in the soil of infected localities, and particularly in soil which contains a high proportion of organic matter of human or animal origin. They are capable of life in waters which are grossly polluted and show a high bacterial content, but in pure water or in water exposed to the purifying influences of sedimentation, oxygenation, and sunlight their life is comparatively short, and their powers of multiplication are very limited.

"These organisms reach the alimentary tract of man and animals by means of infected soil, food, or water, and there they flourish and produce toxins which, on absorption into the blood-stream, initiate the goitrous changes in the thyroid gland. It seems almost certain that the great source of the disease is the infected individual, and that he is the producer, the reservoir, and the distributor or 'carrier' of the infecting agents, which are discharged from the body in the fæces, and it may be in other ways not known to us, as, for example, in the urine and saliva. The evidence, provided by the recorded results of experimental research, appears to warrant the belief that the causal agents are facultative anaerobic organisms, probably bacteria, inhabiting the intestinal tract; it does not, however, permit of a more definite conclusion as to the nature of these agents.

"Spontaneous recovery, while the patient continues to live in the endemic area, is not uncommon. It appears to confer a degree of immunity against recurrence. Incipient goitres very commonly disappear spontaneously when the patient leaves the goitrous locality.

"The immunity conferred by such an attack of goitre is of a very transitory character; with succeeding springs and autumns, in parts of Himalayan India, recurring attacks of thyroid hyperplasia occur, and the gland increases in size by a step-like process.

"**PROPHYLAXIS.**—The improvement of personal hygiene, the provision and maintenance of sanitary dwellings and of pure and well-protected water supplies, the institution of hygienic systems of conservancy, the proper disposal of sewage, the removal of stables and byres of domestic animals to a considerable distance from human habitations, the abolition of cess-pits and of manure heaps in the immediate vicinity of dwellings, are measures which will result in the diminution or disappearance of the disease in goitrous localities.

"**TREATMENT.**—The treatment of goitre depends upon the stage to which the disease has progressed. Medicinal measures are applicable only to cases of comparatively recent origin; when secondary degenerative changes—cysts, adenomata, fibrosis, and calcification—have become ingrafted upon the initial process of thyroid hyperplasia, medicinal treatment is of little or no avail, and the case must be dealt with by surgical means.

"When goitre has developed in a locality where the disease abounds, cases of recent origin and of small size, especially in young people, usually disappear spontaneously when the patients are removed to a non-goitrous district. Residence at the sea coast is often of considerable curative value in such cases. It is to be remembered that persons who have once suffered from goitre are prone to a recurrence of the swelling, should they again reside in a goitrous district. Change of residence, however, is a measure which is not practicable in the majority of cases. Under such circumstances, treatment should be directed to the removal of the exciting cause of the disease, and of the factors which favour its action.

"In dealing with the exciting agent or agents of goitre it is necessary (1) to prevent their entry into the body, and (2) to destroy or diminish the number of those which already exist therein. We must therefore correct all unhygienic conditions of life, advise the use of boiled water or of water which has been sterilized, and instruct the patient to avoid the contamination of food by soil-infected hands. Of remedies which may be employed to destroy or to reduce the numbers of the goitrogenous organisms in the alimentary tract, the most important are the **Antiseptics**—iodine, thymol, salol, β -naphthol, quinine, hydrofluoric acid, the *Bacillus bulgaricus*—and vaccines.

"**Iodine** is the most potent of all known remedies in the treatment of parenchymatous goitre. It is best given in the form of the tincture, either alone or combined with iodide of potassium. The drug must be administered in sufficiently large doses to be efficacious. Five minims of the tincture, combined with five grains of the potassium salt, is a suitable initial dose. This may gradually be increased till the patient is taking three or four times as much; care must be taken to stop the administration of iodine if symptoms of iodism are produced or if the digestion is upset. It is to be remembered that the indiscriminate use of iodine may precipitate the onset of Graves's disease ('Iodine-Basedow' of German authors). It should not, therefore, be administered in cases in which cardiovascular symptoms, however slight, are present. When prescribed in suitable doses, its effect on parenchymatous goitres is obvious within a month. If it produces no good effect in this time, its continued use is not likely to be beneficial. Iodine may be applied externally over the enlarged thyroid, either in the form of the biniodide of mercury ointment, or of the tincture. The ointment is much used in India, where the patient is instructed to rub it well into the neck, and to sit exposed to the sun for one or two hours. A few such applications often result in marked reduction in size of the swelling. The external application of iodine is a useful adjunct to other forms of medication.

"Of intestinal antiseptics the most potent is **Thymol**. It is given in doses of 10 gr. night and morning, and is best administered in the form of a coarse powder, washed down by a draught of water. The bowels should be kept active by the occasional use of salines, and all solvents of the drug must be excluded from the dietary. In recent cases of the disease the beneficial effects of this drug are often very striking. The dietetic restrictions attending its use make it more suitable for cases of the disease amongst Indians than amongst Europeans. In the latter, **Salol** or β -**naphthol** are more convenient but less efficient remedies. They may be administered in full doses twice daily. Large doses of **Quinine** are often useful in early cases, and dilute **Hydrofluoric Acid** (1-500), in doses of 20 to 60 min., has been employed with success in its treatment. '**Soured Milk**,' prepared from a good strain of the Bulgarian bacillus, is a useful remedy, either alone or as an adjunct to other forms of medicinal treatment. (For illustrations, see original paper.)

"**Autogenous Vaccines**, prepared from intestinal organisms belonging to the colon group, have been employed successfully in the treatment of recent cases of goitre. These vaccines should be administered in increasing doses, varying from 150,000,000 to 1,000,000,000 of the organism, at intervals of one week.

"An effective measure in the treatment of goitre consists in excluding the operation, or counteracting the effect, of those factors which favour the action of the excitants of the disease by making undue demands upon the functional powers of the thyroid gland. The patient should, therefore, live under the best possible hygienic conditions of life in large well-ventilated rooms or in the open air, and at an altitude as near sea-level as possible; the dietary should be largely vegetarian, meat being restricted to once in the day. Constipation and intestinal disorders must be corrected, and the bowel freed of parasitic worms, if these should be present.

"The patient must lead a life which does not excite the emotions, and in cases associated with the onset of puberty or of menstruation, and in those which persist *after* pregnancy, some preparation of **Thyroid Extract** should be administered. The liquor thyroidei (B.P.) is the most efficient of the preparations of the gland, but when this is not available, the fresh tabloids are very convenient and effective. Many cases of the disease, especially in young girls, respond readily to this treatment, combined with attention to the bowels; this is often all that is required to cause the disappearance of the swelling. Thyroid preparations act mainly by easing the strain on the hypertrophied gland. They are often ineffective where there is much intestinal fermentation, so that it is well, when employing them, to put the intestinal tract into as healthy a state as possible by the use of appropriate remedies. Indeed, if this is not done, the most efficient of thyroid preparations may be rendered devoid of beneficial action.

"Thyroid extract is sometimes effective in cases which are not influenced by iodine. Its potency is increased by its combination with potassium iodide, or with arsenious acid in small doses. The initial dose (of thyroid gland preparations) should in all cases be small, and should be increased with caution. The smallest dose which produces the desired effect is the dose to employ. When tabloid preparations are prescribed, care should be taken to ascertain their precise strength in terms of the fresh gland. Cardiac weakness is a contra-indication to their use.

"One or other, or a combination, of these measures will effect a cure in the majority of recent cases of parenchymatous goitre. Cases are occasionally met with, however, which, though apparently suitable for medicinal treatment, resist all measures which are employed; they are probably those in which a considerable degree of fibrotic change has occurred."

GOITRE, EXOPHTHALMIC.*Herbert French, M.D., F.R.C.P.*

PATHOLOGY.—Perhaps too narrow a view of the diseases of the thyroid gland is taken when a purely patho-histological basis of subdivision is relied on; it is important to bear in mind that, in the clinical course of a particular case, the changes are not necessarily the same at successive dates. Rogers¹ lays stress on this, and points out that the more carefully one follows cases up, the greater is the number in which an apparently 'simple' goitre develops later on either an increased activity with symptoms of Graves's disease, or lessened activity with symptoms of myxœdema—the latter often with a larger bulk of substance in the thyroid-gland region rather than with obvious diminution, the increased bulk containing but little real thyroid tissue, however; or, again, the same patient may exhibit 'simple' goitre for years; then a period of hyperthyroidism, followed by degenerative changes in the gland that lead to a third period, hypothyroidism. He holds the view that "all the acquired diseases of the thyroid, with the exception of cancer, begin with a simple hypertrophy which is apparently physiological and not pathological, and is accompanied by more or less distinct signs of hypothyroidism. If thyroid disease is to follow, it advances from this point to the different forms of simple goitre: or through intensification of the signs of hypothyroidism with a decrease or increase in the size of the 'goitre' into myxœdema; or through a more or less rapid change of the signs of hypothyroidism into those of hyperthyroidism to which the symptom of exophthalmos may be added finally, in the more severe cases. If exophthalmic goitre lasts long enough, a myxœdematoid state follows. Any simple goitre which has existed, perhaps, for years without the accompaniment of disturbances in other organs, may give rise to hypo- or hyperthyroid symptoms, and develop into myxœdema or exophthalmic goitre."

A great deal of histological work has been done in the Mayo clinic upon the characters of the thyroid-gland tissues removed from patients suffering from various forms of goitre, exophthalmic and otherwise; and the results have been embodied in paper form by Wilson.² Attempts are made to differentiate true Graves's disease from other forms of goitre which simulate Graves's disease clinically; and apparently the view held is that it is not possible to be sure whether a case is Graves's disease or not until sections of the gland have been examined microscopically. Those interested in the subject should consult the original papers. He finds it impossible to draw definite conclusions from a single section from the gland. He reports that each acinus of the thyroid gland can take on changes unlike those found within those adjoining it, so that it is necessary, in attempting to determine the dominant pathological condition of the gland for purposes of classification, to make a detailed analysis from the study of sections from many areas, and to summarize the tabulated record of the observations. [This admission seems to us to weaken very much his argument that microscopical examination is essential in deter-

mining the diagnosis of exophthalmic as distinct from other forms of goitre.—H. F.]

SYMPTOMS.—Marañón³ is of opinion that cases of Graves's disease are often sufferers from hyperchlorhydria, and that this is the cause of the various gastric symptoms to which these patients are liable. He holds that the hyperchlorhydria is due to excessive stimulation of the gastric secretion of the excited vagus nerves.

An instructive analysis of ninety-three consecutive cases of Graves's disease is supplied by Gurney.⁴ The death-rate is 25 per cent in cases beginning between ten and fifteen years of age, and increases gradually to 44.5 per cent in cases beginning after forty-five. In cases coming into hospital who have been ill under one year, the death-rate was 35 per cent; between one and two years, 75 per cent. The rate falls after the fourth year, as after that length of time the disease may be regarded as chronic, and symptoms are always less acute.

In addition to these points, early development of very acute symptoms, such as diarrhoea and tachycardia, adds to the gravity of the prognosis.

TREATMENT.—This consisted of **Rest in Bed** in all cases. Various drugs were used according to the most prominent symptoms in each case. Up to 1908 most patients were treated by the electric battery, and more recently by **X Rays**. There was considerable temporary improvement, but possibly no more than by other means. It is too early to speak of the permanency of the improvement under *x* rays. (*See also p. 58.*)

Rodagen, thyroidectin, antithyroid serum, and antithyroidin have all been used, and while each has been successful in some cases, none has had a generally good enough result to encourage its universal use.

Of 93 cases, 64 have been traced at periods varying from six months up to ten years since leaving the infirmary: 18.75 per cent declare themselves quite well and able to work; 20.3 per cent are definitely improved; 20.3 per cent are much the same; 4.75 per cent have developed myxœdema; 6.25 per cent were transferred to surgical wards; 29.7 per cent are dead (6.25 per cent while under treatment in the infirmary).

Many patients who are entirely cured of all disturbing symptoms, and who are otherwise absolutely well, retain some permanent enlargement of the thyroid.

Watson⁵ advocates a new injection which he has found both simple and effective, namely that of **Quinine** and **Urea Hydrochloride**. An all-glass syringe with a slip-joint platinum needle two inches in length was used; local anæsthesia by skin infiltration; and separate injections at one to four points made into each lobe and the isthmus of the gland, from 25 to 40 min. of a 4 per cent solution of quinine and urea hydrochloride being used for each part. The improvement after even one set of injections was marked, the pulse-rate falling from 160 to 90 within three days. A second injection was given after an interval of ten days, but if what is reported of Watson's

three cases holds good of others, repetition of the injections does not seem to be required often. (*See also p. 27.*)

Porter⁶ gives a further full report upon his method of treating Graves's disease by **Injections of Boiling Water** into the thyroid gland (*see MEDICAL ANNUAL, 1914, p. 607*). "A syringe of 10 c.c. or 20 c.c. capacity is best. The needle should be long, flexible, and rather fine. After proper cleansing, the areas to be injected are infiltrated with 1 percent novocain. The filled syringe is removed from the water, which is actually boiling, and the injection quickly made. From 5 to 20 c.c. are injected according to the site of the lobe. By partially withdrawing the needle and reinserting it, contiguous areas may be injected through one puncture. The patients should remain quiet for half an hour or an hour after the injection. The needle punctures are covered for a couple of hours with gauze wrung out of alcohol. Sloughing has never occurred, and the small eschars on the skin produced by the needle are not permanent. The needle should penetrate the skin as nearly at right angles as possible in order to reduce the burning to a minimum. Most patients complain immediately after the injection of a feeling of fullness in the goitre and some pain in the sides of the occiput, but the discomfort is not great.

"The injections are to be repeated until the desired effect is attained. If one is using the treatment preparatory to thyroidectomy, it is well to repeat the injections every two or three days, if more than one is necessary; but if one has decided to try to effect a cure by this means, it is better to wait a week or ten days before repeating the injections, for while the improvement is usually marked within the first forty-eight hours, it does not reach the maximum for ten days or two weeks.

"It is better, especially in the larger goitres, to inject two, three, or more areas at one séance than to make the injections at intervals. In some cases with small, ill-defined glands it is better to make the injections through a small incision in the mid-line, done under local anæsthesia, which will enable the operator to do the work under guidance of the eye."

Porter concludes: "(1) Injections of boiling water into the gland should be substituted for medical treatment in patients with small thyroids and moderate symptoms of hyperthyroidism. (2) This method is also peculiarly well adapted to the treatment of patients with moderate or severe symptoms and relatively small glands, and especially to cases wherein the hyperplasia is circumscribed. It is therefore well adapted to the treatment of patients who have had a lobectomy done and are still suffering from symptoms of hyperthyroidism with hypertrophy of the remaining lobe. (3) Patients with large goitres and extreme symptoms of hyperthyroidism should be treated with the injections until they become safe surgical risks, and then have the gland removed. (4) Boiling-water injections are not recommended in non-toxic goitre. In such cases, as in patients with large goitres and toxic symptoms but who are good surgical risks,

thyroidectomy should be the chosen method of treatment. (5) In sub-sternal hyperactive goitres the removal of which would be hazardous, boiling-water injections under guidance of the eye should be tried."

For those who may be wishful to try the Beebe **Serum** treatment in a particular case, the following explicit directions given by Beebe⁷ himself will be helpful: "As a rule the first injections of the thyroid antiserum are borne well, without local or systemic reaction of any moment. One occasionally encounters a case, however, which is unusually sensitive, and the first injection, if not carefully proportioned, may cause a very marked reaction at the site of injection, evidenced by a brawny swelling which may extend below the elbow, heat, redness, and pain. Some general reaction, accompanied by fever, nausea, and general malaise, is also shown. These cases are unusual, and nearly always are found to occur in neurotic persons only mildly affected by the disease. In the severe toxic forms of the disease I have at times given three injections of 1 c.c. each during the first twenty-four hours of the treatment. However, it is best as a rule to begin with a small dose, not more than $\frac{1}{2}$ c.c., and observe its reaction before increasing the dose. A suitable method to follow in beginning the treatment is outlined below. The best site for the injection is a point midway between the elbow and shoulder on the outer aspect of the arm. The injection should be made into the subcutaneous areolar tissue. For the first injection give 5 min. ($\frac{1}{2}$ c.c.). Immediately after the injection is made, apply hot compresses at the site, and continue them for one hour. Following this treatment, apply a wet dressing of 50 per cent alcohol. There may be no local reaction whatever; in the majority of cases there is a localized area of tumefaction: the skin is slightly reddened, hot, and sensitive. This reaction develops to its full height in from three to seven hours, and then subsides to a normal condition within a few hours. If the local reaction is negative or very mild, a second injection may be made the following day in the other arm, giving a dose of from 7 to 8 min. The site of injection should be treated as before. The local conditions being favourable, the third injection may be made on the third day of the treatment in the first arm injected, giving a dose of from 10 to 12 min. With a favourable local reaction the following doses should be of a full tube of the serum every second day, using alternate arms for the site of injection. In the very unusual cases where the first reaction is severe and does not subside promptly one should wait until the primary reaction has entirely subsided, and then begin again with a smaller dose, from 2 to 3 min. of the serum. It is not wise to repeat the injections until the previous reaction has nearly if not entirely subsided.

"In some instances the smaller doses of serum are well taken and no disturbing reaction occurs until four or five injections of a full tube have been given. Then each injection causes an increasing reaction, and if continued at the same interval as before, a condition of great discomfort to the patient follows. The arm may show a brawny, painful inflammation extending from the shoulder to the wrist. It

may have much of the appearance of erysipelas, and often the physician who first sees the reaction fears a severe infection. Wet dressings of ice-water, the lotion of lead and opium, or 50 per cent alcohol afford the most relief. The same rule is to be followed in such cases. Allow the local reaction to entirely subside, and then begin by small doses. It should be recognized, however, that in the majority of cases no disturbing reaction occurs; there is some local infiltration and a little heat, which subside within a few hours.

"The question of a possible danger from anaphylaxis may be considered. In the beginning of the serum treatment, before the nature of and danger from anaphylaxis were appreciated, and when much larger doses of the serum were given without any relation to the time element, we had a few reactions which were undoubtedly anaphylactic in character. About ten to fifteen minutes following the injection there occurred a sensation of suffocation, the skin of the whole body itched intensely and became reddened and, particularly about the face, œdematous. The reaction was very distressing to the patient, but passed in a comparatively short time. If the directions given above are followed, no danger from such a cause will arise. I have seen a few reactions of the type of local anaphylaxis described by Arthus. These never occur until a few previous injections have been given. Instead of a diffuse swelling and infiltration there is a small area of intense reaction immediately at the point of injection, and this reaction has all the characteristics of a small abscess. These rarely occur, and the physician is inclined to conclude that his technique has been faulty or that the serum has been infected. In a few instances it has been advisable to open the abscess, while some of them have pointed and opened spontaneously. The contents have been sterile in every case that I have seen. There is, in my opinion, every reason to class these reactions with those described by Arthus, who noted that repeated injections of antigen in a partially immunized animal would occasionally produce an abscess.

"It rarely happens that the needle punctures a small vein and the whole dose of the serum enters the circulation at once. If this patient has had a number of previous injections, and if as much as a full tube has entered the vein, there may be an immediate reaction of the following character: The patient has an intense pain in the back and experiences a sense of suffocation, the skin becomes flushed and itches intensely, and the patient is nauseated and may vomit; syncope may follow. Such a reaction, if it occurs, follows directly after the serum is injected. The patient should lie down at once, the clothing about the neck be loosened, iced towels applied to the head, and if desired, aromatic spirits of ammonia inhaled. It is quite unnecessary to do anything more, for before a hypodermic injection can be prepared the reaction has largely passed. The whole disturbance quickly subsides, and the patient, aside from being somewhat frightened, is quite all right. Such a reaction is very unusual. I myself have had only two in the last three years, and I have given thousands of injections during

this time. If the physician has never seen such a reaction and does not know that it may occur, he, as well as the patient, is likely to be frightened, a situation which causes much useless distress to all concerned.

"The majority of patients show a very mild, or no, reaction. They need no particular care in this respect; but unless the physician knows what may follow the injection, he is in no position to advise the patient.

"The final word may be said about the reaction. Some patients cannot at any time take more than 8 min., and they do not need more to get excellent results. It is not a matter of variation of the activity of the serum, but purely a question of the individual's sensitiveness. The same serum given to one patient in doses of 1 c.c. causes no reaction of any moment, while to another it may be entirely too large to be borne with comfort. Experiments are under way at the present time to find a suitable method of eliminating these local reactions and permitting a slow absorption.

"It must be understood that the serum is only a part of the medical treatment, and all those medical measures which have been proved of value should be instituted."

Beebe claims superiority for this treatment over surgical methods, at any rate as an initial measure. In 3000 cases he says he has achieved cure in 50 per cent and amelioration in 30 per cent.

Davidson⁸ has devoted careful attention to the serum treatment. The apparently cured, markedly improved, and moderately improved formed 50 per cent of his cases. Twenty-nine per cent who showed no improvement, either gave the treatment little chance or were cases of the mixed varieties. In other words, almost every patient with hyperthyroidism who was willing to try the serum more or less faithfully was benefited by it to some extent, and this under very unfavourable hygienic conditions.

REFERENCES.—¹*Ann. Surg.* 1914, ii, 281; ²*Jour. Amer. Med. Assoc.* 1914, i, 111; ³*Rev. de Méd.* 1914, i, 161; ⁴*Brit. Med. Jour.* 1915, i, 1914; ⁵*Jour. Amer. Med. Assoc.* 1915, i, 126; ⁶*Surg. Gyn. and Obst.* 1915, i, 1; ⁷*Jour. Amer. Med. Assoc.* 1915, i, 413; ⁸*Med. Rec.* 1913, ii, 1112.

GONORRHOEA.

C. F. Marshall, M.D.

TREATMENT.—Wyndham Powell¹ advocates **Irrigation** in acute gonorrhœa in the male. He considers it essential to flush the anterior urethra with considerable force—a hydrostatic pressure of six feet. The urethra must be ballooned and then rapidly emptied, using a single-hole nozzle. This process ensures free circulation of fluid up to the compressor urethræ, and the over-distention of the elastic urethra and its recoil facilitate the entry of the fluid into the lacunæ and ducts of Littre. With the two-way nozzle this distention is sustained with probably no circulation of fluid in the bulbous urethra. Only in hyperacute cases is it necessary to go more gently. In the early stage, when only the first two or three inches of the urethra are affected, the whole anterior urethra is irrigated with full pressure.

A section of urethra treated with **Permanganate of Potassium** offers a barrier to the spread of gonorrhœa, whereas irritating solutions such as silver nitrate lower the vitality of the mucous membrane and favour the spread of infection. The strength of permanganate should be 1-5000 to 1-2000, the temperature 98° to 100°, and the quantity 5 or 6 pints. For the first three or four days the irrigation is performed morning and evening with a 1-3000 solution; then once daily with 1-2000. In acute cases a strength of 1-5000 is used, and in painful or sensitive cases this is preceded by an injection of 20 drops of a 2 per cent solution of cocaine, retained for two or three minutes. According to Powell, if this treatment fails to cause rapid cure, this signifies persistence of infection in the lacunæ of Morgagni and glands of Littre, and is due to treatment not being begun early enough. In such cases he recommends the use of Kollman's irrigating dilator once or twice a week. The instrument is gently screwed up till slight pressure is felt. The solution used is **Oxycyanide of Mercury** 1-4000.

G. B. Lake² reports good results from **Intramuscular Injections of Succinimide of Mercury** in gonorrhœal urethritis. In the 20 cases treated, 13 became clear of gonococci in an average of less than seven days, and remained clear for periods ranging from three weeks to seven months. The results show 65 per cent cured in less than a week, 15 per cent probably cured and reinfected, 10 per cent not followed up, and 10 per cent failures. Three cases had no local treatment at all; two of these were not followed up, and one relapsed, so that it seems advisable to give local treatment as well. The dose given was 40 mgrams in the earlier cases and 65 to 78 mgrams in the later. A second dose of 40 mgrams is recommended if the gonococci do not disappear in six days.

B. L. Wright³ has also obtained good results in 24 cases of *gonorrhœal arthritis*, among a great variety of infective diseases in which he has used intramuscular injections of succinimide of mercury. He first tried this method in cases of tuberculosis in 1905, and reported good results both in pulmonary tuberculosis and tuberculous arthritis. Since then he has applied it to the majority of infections due to bacteria, on the theory that mercury is the chemical affinity for every vegetable parasite.

Russ⁴ has applied **Electrolysis** to the treatment of acute gonorrhœa. The method, originally devised for the treatment of chronic cystitis, depends on the fact that bacteria are attracted towards the positive pole of an electric circuit. The technique for acute gonorrhœa is as follows: The patient, having retained his urine for a few hours, passes half of it to wash out the urethra. A platinized catheter with numerous perforations is passed down to the compressor muscle. The catheter is furnished with a rubber collar which fits the meatus, and contains a platinum stylet. A lint-covered pad with a flexible metallic core is wrung out in warm saline solution and applied to the perineum, scrotum, and root of the penis. A 1 per cent solution of

sodium iodide is injected into the catheter, the rubber collar preventing its escape. The pad is connected with the negative and the stylet with the positive pole of the battery. A current of 1 to 2 milliamperes is passed for twenty-five minutes, and the catheter is kept full of the solution by means of a syringe. The current is turned off and the catheter placed in a glass of water. After the first few applications the perforations in the catheter are choked with muco-pus containing numerous gonococci. The patient then passes the remainder of urine. The treatment is applied every day, till the discharge has ceased, then every other day till the urine is free from threads. In 28 cases the duration of treatment was three or four weeks. (*See also* p. 65.)

The action of **Copaiba** is discussed on p. 14.

Epididymitis.—W. J. Robinson⁵ holds that this complication should not occur in more than 2 or 3 per cent of cases properly treated, and it is often due to strong injections, prolonged irrigations, passage of instruments in the acute stage, and massage of the prostate. He attributes the usual cessation of the urethral discharge at the onset of epididymitis to the effect of the raised temperature on the gonococci. The treatment recommended includes **Rest** in bed, **Elevation of the Testicles**, and gauze **Compresses** wrung out in a hot solution of aluminium acetate and glycerin, 8 oz. of each to the pint (the author considers that cold applications predispose to induration with subsequent sterility). Instead of compresses, or after they have been used for a day, the following **Ointments** may be applied:—

R	Mercurial Ointment	$\bar{3}j$	Belladonna Ointment	$\bar{3}ij$
	Guaiacol	$\bar{3}ss$	Benzoated Lard	to $\bar{3}j$
	Ichthyol	$\bar{3}ss$		

Or,

R	Ammoniated Mercury	$\bar{5}ss$	Atropine Sulphate	gr. j
	Methyl Salicylate	$\bar{5}j$	Lanoline	$\bar{3}ss$
	Morphine Sulphate	gr. iv	Benzoated Lard	$\bar{5}j$

The ointment is gently rubbed in, and also applied on cotton kept in place by a suspensory bandage. In some cases the author has had good results from injection of **Colloidal Silver** (collargol or electrargol) directly into the epididymis. Internally he gives **Salicylate of Sodium** (15 gr. four times a day), or **Acetyl-Salicylic Acid** (8 gr. thrice daily), and **Magnesium Sulphate**. Morphine should be avoided, as it induces constipation and aggravates prostatitis. A hot enema at night containing 15 gr. of **Antipyrin** and 5 min. of **Tincture of Opium** is also useful. The author regards local treatment of the urethra during an attack of epididymitis as absolutely contra-indicated, but internal drugs, such as **Balsams**, **Hexamine**, etc., may be continued. He considers **Strapping the Testicle** a useful procedure to relieve pain and promote absorption, but uses a piece of rubber bandage kept in place by a piece of adhesive plaster attached to one end, instead of the old-fashioned strapping with

adhesive plaster. The author is not in favour of any of the operative methods of treatment which have been devised.

T. Asch⁶ reports good results from the injection of **Novocain** in acute gonorrhoeal epididymitis. Six c.c. of a sterile 1 per cent solution of novocain were injected directly into the epididymis with an ordinary hypodermic syringe with a very fine needle. The fluid was evenly distributed throughout the inflamed area, the needle being withdrawn from the epididymis and reinserted at different points, without withdrawal through the skin. One injection of 6 c.c. was usually enough, but in some cases two were given. Pain ceased directly, and the temperature became normal in twenty-four or forty-eight hours. The swelling subsided in two or three weeks. It is claimed that this treatment is painless and does not confine the patient to bed.

Gonorrhœa in the Female.—W. J. Robinson⁷ states that when the infecting man has chronic gonorrhœa, the infection in the woman is usually subacute or chronic; but when the man has acute gonorrhœa, the infection in the woman may be hyperacute. In the latter case symptoms may appear in twenty-four hours, and salpingitis may develop within a few days or even hours. This may be explained by the suction action of the uterus, as it is impossible for the infection to reach the tubes by continuous extension in such a short time.

Robinson warns against too energetic treatment, and holds that the introduction of syringes and probes into the cervix, the scraping and cauterizing with strong caustic solutions, are in many cases responsible for extension of the disease to the uterus and tubes. His plan of treatment is as follows: (1) **Rest** and avoidance of coitus; **Balsams and Hyoscyamus** if the urethra is involved. (2) **Vaginal Douches** of iodine (one drachm of tincture to a pint of water), lactic acid (1–500 to 1–1000), a mixture of alum 4 oz., zinc sulphate 1 oz., and copper sulphate $\frac{1}{2}$ oz. (one tablespoonful to one or two quarts of water). The patient should lie on her back and should remain so for half an hour afterwards. The iodine and lactic acid are given in the morning and the astringent solution in the evening. (3) **Suppositories** of protargol (5 gr.) or of the lactic acid bacillus (10 gr.), inserted high up at night. (4) If Bartholin's ducts are affected, **Cauterization** with a thin probe or injection of 10 per cent silver nitrate. If the urethra is affected, swabbing with 5 to 10 per cent silver nitrate. The same to any erosions of the vagina, or tincture of iodine. If the cervix is affected, paint with **Tincture of Iodine** and apply the same on a cotton swab to the cervical canal. When the infection has spread to the uterus and tubes, the proper treatment is rest, hot or cold compresses to the abdomen, and tampons of boroglycerin or ichthyol-glycerin. Injection or swabbing of the uterus with strong applications, and curetting the uterus are useless and injurious. Such measures are more likely to cause further spread of infection than to remove all the gonococci. **Vaccines** may be useful in conditions, such as salpingitis, which are not accessible to local treatment.

Vulvo-vaginitis in Children.—Taussig⁸ reports on 66 cases of vulvo-vaginitis in children varying in age from three weeks to twelve years, the majority being of school age. He regards the school lavatory seat as the most frequent source of infection. There was no evidence of rape in any of his cases, and in only two instances was gonorrhœa found in the mother. Vulvo-vaginitis is rarely observed after the age of puberty, owing to the protection afforded by growth of the labia majora and pubic hair.

As regards treatment, he prefers instillation of **Silver Preparations** by means of an ordinary rubber-tipped urethral syringe. For the first two weeks 25 per cent argyrol is injected twice daily; for the third and fourth weeks 1 per cent silver nitrate daily; for the fifth and sixth weeks 2 per cent silver nitrate every other day; from the seventh to the tenth week 4 per cent silver nitrate once or twice a week. He regards vaccines as useless in gonorrhœa of mucous membranes, and obtained no good results from the lactic acid bacillus treatment. In Taussig's cases complications were rare—one case of supposed salpingitis and one of arthritis. He considers that with careful treatment 75 per cent of cases should be cured. He admits, however, that the proof of cure is difficult, even by means of the complement-fixation test. For *prophylaxis* he recommends the following measures: (1) Instillation of a drop of 2 per cent silver nitrate solution in the vaginal orifice of every new-born girl whose mother shows evidence of gonorrhœa; (2) Notification of the disease; (3) Instruction of parents in measures to prevent spread of the infection—the use of separate towels, etc., sleeping in a separate bed, disinfection of contaminated clothing, and special precautions in the use of the lavatory; (4) Investigation by a visiting nurse of the probable origin of the infection; (5) The adoption of a low U-shaped lavatory seat in schools and tenement houses.

REFERENCES.—¹*Brit. Med. Jour.* 1914, ii, 529; ²*Med. Rec.* 1915, i, 643; ³*Ibid.* 1914, ii, 11; ⁴*Brit. Med. Jour.* 1915, i, 999; ⁵*N.Y. Med. Jour.* 1915, i, 1205; ⁶*Amer. Jour. Surg.* 1915, i, 200; ⁷*Med. Rec.* 1915, i, 634; ⁸*Amer. Jour. Med. Sci.* 1914, ii, 480.

GOUT.

Herbert French, M.D., F.R.C.P.

Chace and Fine¹ speak highly of the value of **Atophan** in the treatment of gout, but they do not give the doses employed. A weak spot in their evidence is the fact that they relied mainly on determinations of the uric acid in the patient's blood in deciding whether the treatment was doing good. In gouty cases the figure was from 4 to 6 mgrams of uric acid per 100 grams of blood; atophan reduced this to 2 mgrams per 100 grams. [Possibly these laboratory figures afford a false criterion as to the benefit to the patient himself; it does not follow that he is necessarily better because his blood uric acid is reduced.—H. F.]

With regard to the influence of **Radium Emanation** on uric-acid metabolism, various workers have emphasized essentially two points: the increased diminution in the urine, and the reduction of uric acid

in the blood. Chace and Fine have therefore treated thirteen cases of gout and arthritis in an emanatorium with radium emanation of 0.5 to 150 Maché units per litre of air in one- to two-hour sittings for one to two months; two cases of arthritis with radium drinking water; and five cases of arthritis with injections of radium bromide equivalent to 50 to 100 micrograms of the element. In no case was there any change in the uric-acid concentration of the blood. With regard to clinical effects, in two instances in which radium solutions were injected there did appear to be improvement; otherwise these authors were not at all impressed by the results.

REFERENCE.—¹*Jour. Amer. Med. Assoc.* 1914, ii, 945.

GRAVES'S DISEASE. (*See* GOITRE, EXOPHTHALMIC.)

GUINEA-WORM DISEASE. *Sir Leonard Rogers, M.D., F.R.C.P.*

R. E. McConnell¹ recently reviewed our knowledge of this disease, including some experience of his own on the West Coast of Africa. Evidence shows that the time which elapses between the ingestion of the larvæ and the appearance of the mature embryo-bearing female at the surface of the body is about one year or a little longer. Among many cases seen by him, in only two was the worm found above the knee, while the great majority point over the ankle or foot, from which the embryos can most readily reach water. Infection probably occurs most immediately before the rains, when the pools of water are lowest and the cyclops densest in them. Straining the water through cotton completely removes the cyclops, and is the simplest prophylactic method. He advises the usual remedies of applying water to hasten the pointing of the worm, and winding it out gradually day by day to prevent breaking it.

REFERENCE.—¹*Jour. Trop. Med.* 1914, 337.

GUNSHOT INJURIES. (*Vol.* 1915, *p.* 311.)

HÆMOPHILIA.

Herbert French, M.D., F.R.C.P.

Arthritis.—It is by no means a new observation that the joint changes which hæmophilia may give rise to simulate those of tuberculous arthritis so closely that in some cases operative measures have been adopted with fatal results; but it is useful to have a good summary of the subject, such as that by Vegas.¹ The first cases recorded were in 1880, by Koenig. He reported two examples of arthrotomy for supposed tuberculous joint disease in children, both dying of hæmorrhage. He laid stress, in diagnosing it, upon the history, its occurrence in young people and anæmic males, the spontaneous onset of the joint swelling, and its painless nature (though the movements become steadily more and more restricted).

The changes within the joints affected may be divided into three stages, namely: (1) Effusion of blood in the joint having the appearance of a hæmarthrosis; the patient in this stage can be cured. (2) A new effusion of blood occurs, producing a panarthrititis with all the

characteristics of a tuberculous joint. (3) In this period contractures, ankylosis, and deformity of the articular extremities of the bones are present through regressive metamorphosis.

The effusion of blood in the joint appears suddenly, as in traumatic hæmarthrosis: sometimes there is peri-articular, subcutaneous ecchymosis, which may be accompanied by fever (38° to 39° C.), due, as Broca has demonstrated, to the resorption of the effused blood. Though at times it is confined to one joint, hæmophilia usually attacks different joints simultaneously, this occurring in 28 out of 32 cases. Usually the first degree of the lesion of the joint is not noticed, and one first perceives it in its more advanced second stage, characterized by effusion and synovial thickening, which, as we have seen, is easily mistaken for tuberculous arthritis.

As regards the pathological anatomy of hæmophilic joints, at the beginning of the effusion only liquid blood is found, afterwards partly discoloured coagula appear, some floating in the liquid, others sticking to the capsule. The capsule is thickened, impregnated with blood pigment, and therefore coloured. In some places fibrinous deposits are noticed, not only in the capsule, but in some parts of the cartilaginous surface, at times extending from one side to the other in the anterior surface. Here and there are seen fringes of a brown colour. The appearance of the cartilage is altered, for it is divided into fibres, and seems to have lost its substance within well-marked limits. In the second period more marked alterations are noted. If there is no fresh hæmorrhage, the effusion is not purely of blood, but serosanguineous, or entirely serous slightly tinged with brown. The aspect of the joint when opened is very characteristic, showing a great quantity of floating synovial fringes of a brown colour.

Radiologists state that they are able to distinguish a hæmophilic from a tuberculous joint by means of the x rays, but this requires considerable experience.

As regards the frequency with which hæmophilia attacks the joints, the general opinion is that the knee is most apt to suffer, secondly the hip, next the elbow, then the fingers, the wrist, and last the ankle. The prognosis of hæmophilic arthritis is variable. The acute form is nearly always cured without leaving any traces; the same thing can be said of the subacute form, but not of the chronic form in which ankylosis and deformities of the joint present an obstacle to movements and walking. A complication which one ought to bear in mind, and which sometimes accompanies hæmophilic arthritis, is the production of osteoma: for in one place a hæmophilic arthritis of the elbow was followed by the production of an osteoma of the brachialis anticus (myositis ossificans).

TREATMENT.—When one is confronted with a hæmophilic lesion of a joint there are two things to be done: local treatment of the joint, and direct action against the hæmophilia. Complete rest in bed, compression of the affected limb in order to assist the resorption of the effusion, and cold compresses on the joint are generally advised.

One must not forget to warn the patient's family that a stiff joint may remain in the second stage of the lesion. In the case of deformity of the joint in chronic cases, it will be necessary to straighten the bent limb by continual extension or by some apparatus that will allow the patient to walk.

Better than all other remedies in the treatment of the hæmophilia itself is the action of fresh **Serums**. For example, antidiphtheritic serum has been tried with success, and this has the advantage of being obtainable anywhere and being easy to handle. Doses of 15 c.c. of fresh serum injected into the veins may be employed, or doses of 30 c.c. for subcutaneous injections; another injection may be made two days later. For young children the doses should be half this quantity. It is recommended not to use ox serum, which has caused complications, such as high fever, vomiting, chills, and cyanosis; and Vegas advocates fresh rabbit serum taken aseptically from the carotid artery. This is the remedy which he uses successfully in his own practice.

Blood Transfusion claimed to be a specific remedy (*p.* 8).

REFERENCE.—¹N. Y. *Med. Jour.* 1914, ii, 549.

HÆMORRHAGE.

Blood Transfusion (*p.* 9), **Tissue Extract** (*p.* 34), and **Brain Lipoid** (*p.* 10) advocated as hæmostatics. **Emetine** (*p.* 18) to stop hæmorrhage after nasal operations. **Normal Serum** advocated (*p.* 31).

HÆMORRHAGIC DISEASE OF THE NEW-BORN.

Frederick Langmead, M.D., F.R.C.P.

The etiology and treatment of this condition were considered in the *MEDICAL ANNUAL* for 1915. At one time regarded as very fatal, it has lost much of its seriousness as the result of the newer methods of treatment. These have arisen from the belief that the infant who is the subject of the malady lacks in its blood elements which are necessary to proper coagulation. The methods advocated recently have had therefore for their object the addition of these precursors of clot-formation. Among such methods, **Transfusion** of blood from a healthy donor takes prominent place. From a study of its effects,¹ Robert A. Green arrives at the following conclusions: (1) Transfusion is a procedure of definitely established specific curative value in the treatment. (2) By its use the mortality of the disease has been already reduced from 50 per cent to 10 per cent. (3) A probable further reduction of mortality may be expected in future from its more prompt and universal application. (4) Successive improvements and simplifications in the technique have now made its performance possible by surgeons of average training, experience, and skill. (5) Of all the methods hitherto devised, that of Kimpton seems distinctly superior in certainty, speed, and ease of accomplishment. (6) Even with transfusion, the prognosis in the rare cases of hæmorrhage from the kidneys is apparently much worse than in other forms of bleeding.

J. C. Hubbard² suggests that the added blood should be transfused free into the abdominal cavity of the baby. He thinks that the operation would take but a few moments, that less anæsthesia would be necessary, that absorption would be sufficiently rapid, and that there would be less risk of an overdose.

REFERENCES.—¹*Boston Med. and Surg. Jour.* 1914, ii, 715; ²*Ibid.* 1915, i, 865.

HÆMORRHOIDS, INJECTION TREATMENT OF. *James Searson, M.D.*

The injection treatment of internal hæmorrhoids has recently been attracting attention in this country, and it is destined, in the writer's judgement, to be more generally adopted here when its obvious merits are more widely known. It is not applicable to all cases. Some are better dealt with by other methods now in common use; but in the cases suitable for this treatment—and they require to be selected with some discrimination—it presents advantages which cannot easily be overrated. Persons who suffer from this disorder are not unnaturally anxious to be treated without pain, without surgery as ordinarily understood, and without detention from business; and while it may appear to be somewhat of an undertaking to comply with these demands, it is not too much to say that there are few, if any, conditions in which it can be so nearly fulfilled as by this method. The practical safety and adequacy of local anæsthesia contribute materially to this result, and it is largely by means of this help that the treatment can be conducted with practical painlessness.

The injection method is in no sense to be regarded as new or modern. It has been largely practised in America, for example, for over fifty years, and it was while on a visit to that country twelve years ago that it was first introduced to the notice of the present writer. It has had periods alike of popularity and reaction, but some of the best men engaged in this line of work on both sides of the Atlantic now recognize its propriety, suitability, and safety, in a considerable proportion of cases. It cannot, however, be too clearly emphasized, that not all cases of hæmorrhoids are suitable for this treatment, and the operator who tries to treat all cases in the same way by this or any other method, regardless of their location, history, and other circumstances, will sooner or later encounter disappointment, and have reason to regret his boldness. Thus, while some, and probably the greater proportion, are curable by the injection of certain remedies, there are undoubtedly a large number of other cases which call for the better known methods of ligature, excision, or the galvanic current.

The injecting agent chiefly used is **Carbolic Acid** in varying strengths from 5 to 50 per cent and upwards. The stronger dilutions are cauterant, anæsthetic, antiseptic, and act by causing instant coagulation of the contents of the pile sac. Sloughing of the tissue results, without, in many cases, giving the patient much inconvenience. These strong solutions are probably most indicated in the old existing matured pile; but even in such cases, the formation of a slough,

with the risk of a resultant ulcerated surface, is not to be lightly undertaken. The weaker strengths, on the other hand, are not sufficiently strong to cause sloughing. They produce retardation and arrest of the circulation, with subsequent resolution and disappearance of the tumour. Of these weaker solutions (e.g., 10 per cent), from 3 to 10 drops, according to the size of the tumour, are usually injected one drop at a time, and only in sufficient quantity to produce a paleness or whiteness of the surface of the pile. Various formulæ are recommended by the different authorities, but they are too numerous to be detailed within the limits of this paper. It is sufficient to state that they all consist of carbolic acid in greater or less strength, having water, glycerin, or oil as the diluting medium, and some have also added other constituents such as ergot, acetate of lead, salicylic acid, hamamelis, or cocaine. Speaking generally, the weaker solutions will be found to act best, and on the whole to yield the most satisfactory results, although the cure may take longer. With regard to the frequency of the injections, as a general rule, and unless there is some strong reason to the contrary such as excessive hæmorrhage or other pressing urgency, a weekly treatment will usually be found most generally satisfactory. This does not impose too much manipulation upon the part, and it usually gives a sufficient period for the beneficial effect to show itself, and absorption and resolution to take place.

One of the most remarkable proximate results is the striking cessation of hæmorrhage. Occasionally cases come under notice where the quantity of blood lost is considerable if not alarming. In such cases, objective results are often obtained with almost dramatic quickness if one is fortunate enough to discover and treat the bleeding area, and this can generally be done by careful search beforehand for the site of the hæmorrhage.

The syringe and needles generally used are those of the ordinary hypodermic type. It is important that the barrel or body of the syringe should be of glass, to guard against the risk of air bubbles. The needles should be long and fine; if they are short, the syringe occupies and obscures the field, and a good view cannot be obtained; if they are not fine, unnecessary pain is experienced on insertion. The writer uses a very fine needle $2\frac{1}{2}$ in. long, connected by a narrow shoulder $2\frac{1}{2}$ in. long to an ordinary glass hypodermic syringe which also measures $2\frac{1}{2}$ in. One is thus able to keep the treatment under observation from first to last, and to deal with any hæmorrhage or other complication which may occur. More recently he has had made a needle slightly curved at the end, with a guard attachment as shown in *Fig. 33*, so that penetration may be more easily made into the apex, so to speak, of the pile, the guard attachment preventing too deep an insertion. This appears to be better adapted, at all events for some cases, than the ordinary straight needle. When not in use, the syringe and needle are kept suspended in 'Brytstele' antiseptic fluid, so that they are always clean and ready for use.

Various rectal specula are recommended, the one most generally used being Hilton's, with Bryant's modification. In withdrawing this speculum, however, the piles tend to catch on the more or less sharp edges, causing much pain to sensitive patients. Messrs. F. Davidson & Co., of 29, Great Portland Street, W., have at my suggestion manufactured a speculum by which this difficulty is overcome, and more

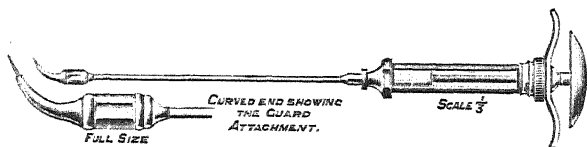


Fig. 33.—Syringe for treatment of hæmorrhoids (Searson).

recently, Messrs. Down Bros. have reproduced it in a convenient smaller size. As shown in Fig. 34, the improved speculum is cone-shaped, with a sliding piece, which on partial withdrawal causes the piles in the exposed area to appear. The slope in the wall of the speculum is very gradual, with smooth and rounded edges. The sharp and more or less cutting edges peculiar to the old form

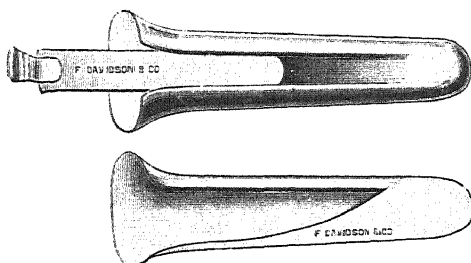


Fig. 34.—Speculum for use in hæmorrhoids (Searson).

are avoided, so that the withdrawal of the instrument is quite easy and painless.

The preparation of the patient, though of the simplest character, is not unimportant. It is better not to allow any laxative to be taken for quite twenty-four to thirty-six hours beforehand. The nature of the laxative, when ordered, is of importance. Paraffin, senna, liquorice, Gregory's powder, and sulphur, are all suitable; while drastic purgatives, such as aloes, calomel, and the stronger salines, are best avoided. Plain and simple food should be taken; alcoholic drinks, condiments, spices, etc., are contra-indicated; and tobacco, if used, should be moderated. Occasionally a simple enema is called for beforehand, and in exceptional cases irrigation of the rectum may be necessary.

Technique.—Although there is much to be said in favour of the lithotomy position, and many prefer it, it will probably as a rule be

found better for the patient to lie on one side, and the side opposite to the lesion is usually recommended. The writer's practice, however, is, for choice, invariably the left side. The patient lies in the semi-prone position; the buttocks should be brought well over the side of the couch, the upper (right) limb fully flexed, the lower almost straight. The operator, seated, facing the head of the couch, has on his right the patient, and on his left a small table furnished with the necessary requirements. Illumination is effected by a forehead light, and assistance is rendered by a competent and accustomed nurse. The anal parts are cleaned and swabbed with warm antiseptic solution, the upper buttock is raised, and the right finger, well lubricated, is gently introduced into the rectum and the part explored. The speculum, warmed and lubricated, is then gently introduced, with the movable slide directed towards the part to be treated. The slide is partly withdrawn, and the pile tissue slips into, and will be seen to occupy, the opening. This is cleaned by swabbing, and a 4 per cent solution of cocaine is sprayed over the surface. The point of the needle, having been passed through a spirit flame and all air expelled, is inserted into the tumour, and the solution pressed slowly home drop by drop. The needle should be allowed to remain in position until the surface colour becomes pale or white, and it is then gradually withdrawn. Bleeding does not usually occur, and when present it is generally arrested easily by pressure before the speculum is withdrawn. Occasionally it is more severe, but it rarely happens that anything more is called for than the application of some adrenalin solution on a piece of sterilized wool. The treatment is completed by drying the part, applying a little sterilized vaseline, and restoring any protrusion.

Contra-indications.—The cases best adapted for injection are the purely internal piles, especially of the bleeding variety associated with an easy, lax, unirritable sphincter which readily allows the introduction of the examining finger. An irritable sphincter which resists the finger may usually be taken as a contra-indication for the time being, and frequently it is the first sign one obtains of the presence of proctitis, ulceration, fissure, fistula, or other rectal or anal disorder. In cases of hypersensitiveness of the part also, it is frequently wise to postpone treatment for a time. Often in such cases the general nervous system calls for rest and attention before local measures can be satisfactorily undertaken. Fibrous hæmorrhoids are not suited for this method, but are better removed in the ordinary way; this especially applies when they lie at or close to the anal margin. Marginal piles as a rule are much more likely to give pain and form thrombi, and they always require to be carefully and judiciously handled. In all cases of inflammation, ulceration, or irritation of the sphincter, it is better to treat the causes of these conditions first. When internal piles are protruded, one is tempted to inject them without using the speculum, but as a general rule it is better to replace them first, then introduce the speculum and proceed in the ordinary way.

HAND, SURGICAL AFFECTIONS OF THE. (*Vol.* 1915, *p.* 315.)**HARELIP.** (*See* CLEFT PALATE.)**HAY FEVER.***J. S. Fraser, M.B., F.R.C.S.*

Manning¹ defines hay fever, or pollen disease, as an exudative catarrh of the conjunctival, nasal, and tracheo-bronchial mucous membrane, produced in hypersensitive individuals by the sensitizing and anaphylatoxic action of the pollen of certain plants. It must not be confused with hyperæsthetic rhinitis, which may occur at any time of the year, and does not carry with it the general constitutional depression which is so characteristic of true hay fever. If a few pollen grains from one of certain grasses, e.g., rye, wheat, timothy, fox-tail, are inserted into the nostrils of a sufferer from rose cold, a typical attack is immediately produced at any time of the year. Again, if a few grains of pollen from certain members of the group ambrosia, e.g., ragweed, golden rod, asters, marigold, are put into the nostrils of a patient subject to autumnal catarrh, an attack follows, even in winter. Pollen from the grasses will have no action on the autumnal catarrh patient, and vice versa.

It has been established experimentally that guinea-pigs can readily be sensitized to pollen protein by minute doses gradually increased, and, after a suitable incubation period, suffer a most severe anaphylactic shock on re-injection. Control animals were not affected by the same dose of pollen protein.

It has been known for some time that the bactericidal power of the nasal secretion is due to proteolytic enzymes. The pollen protein reaches the nasal mucous membrane of all persons, and in most of them the proteolytic enzyme gradually splits the pollen protein into harmless products—proteoses and amino-acids. This occurs slowly, so that the absorption of protein is exceedingly minute. There are certain conditions which interfere with the normal digestive function of the nasal mucosa, and when these arise, sufficient protein may be absorbed to lead to sensitization. Whatever the cause of the disturbance, there occurs an intake of foreign protein, which so injures the mucosa that it remains permanently in a state of increased permeability for the protein. The cells of the mucosa produce a specific ferment directed against the pollen protein, i.e., the local tissues become sensitized. This sensitization gradually reaches all the tissues, which attempt to protect themselves by throwing off the specific proteolytic enzyme. The nasal tissues remain permanently in a state of sensitization, and, when the protein again comes in contact with the sensitized area, it is absorbed unchanged and broken up in the body.

The first symptoms are local—sneezing, and itching and burning in nose, eyes, and throat. The bronchial mucosa may be affected, either directly or through the blood, thus producing asthma.

TREATMENT.—(1) One may attempt to combat the disease by adding some substance to the organism, which will neutralize the

poisonous fraction of the split protein molecule—passive immunization. Dunbar's **Pollantin** is an attempt at passive immunization. Dunbar injected horses with gradually increasing doses of ragweed pollen, with the expectation that a specific antibody would eventually be formed in the serum in sufficient amount for practical use. (2) One may try to develop in the tissue of the individual a substance which will neutralize the poisonous fraction—active immunization. In 1910, Noon and Freeman made the first attempt at active immunization, working with the pollen of grasses. Recently Freeman has reported 84 cases, with complete cure in 30 per cent, almost complete in 35 per cent. The immunity seems to last for at least one year after treatment has been stopped. In the same year, Koessler, of Chicago, worked at active immunization, using ragweed pollen. He reported 10 per cent absolute cures, 70 per cent markedly improved. Manning has adopted Koessler's technique, and treated 21 cases, 14 of whom were relieved.

Goodale² has found, in five patients with *horse asthma*, that the application of **Horse Serum** to an abrasion of the skin caused sharply localized œdema and reddening within a few minutes. In three of these cases the introduction of horse serum into the nose caused œdema of the nasal mucous membrane, together with profuse watery discharge and sneezing. Six cases of bronchial asthma and five of hay fever were negative for both tests. Three cases without vasomotor symptoms, which had received immunizing doses of antitoxin several months previously, showed no reaction to the tests. These experiments indicate that a localized anaphylactic reaction from horse serum may be occasioned in certain individuals who experience asthmatic disturbances in the neighbourhood of horses. A preliminary skin test with horse serum should be made in all patients who have previously received an injection of antitoxin derived from horses, whether tetanus, diphtheria, or plague serum. Furthermore, in all patients who are about to receive antitoxin for the first time, inquiry should be made as to whether they have ever been disturbed by asthmatic symptoms when in the neighbourhood of horses, and if so they should first be tested. In the discussion following Goodale's paper, Shurly stated that by injecting ordinary egg-albumen solution in repeated doses, one caused the death of a guinea-pig, apparently from severe surgical shock. It was exceedingly dangerous to inject any antitoxin after the ninth or tenth day from the initial dose. Those specialists who had seen a death occur within five minutes after the injection of antitoxin, carried with them through life a most profound feeling of the danger to which antitoxin might give rise. For some reason sensitization increased greatly after the ninth or tenth day, and the cutaneous eruption which occurred after antitoxin was almost always found on the ninth day. For this reason, Shurley told his patients that a rash would probably appear at this time. He always asked if the patient was asthmatic or already using antitoxin. Loeb had seen a sensitized animal die in Dunbar's

laboratory in three or four minutes after a second injection. Dunbar then took the urine of that animal and injected it into an unsensitized animal, which died in an even shorter time—thus showing that a deadly poisonous substance was produced in but a few minutes.

Goodale³ reports the results of **Pollen Therapy** in 123 cases. The pollen extract was injected subcutaneously. With regard to the preparation, Goodale gives directions for the collection of the pollen, which may be preserved dry for an indefinite period. The extract is obtained by soaking the pollen in water for a few hours. Trituration is not necessary. Goodale recommends an alcoholic dilution of 13 to 15 per cent by volume if the extract has to be kept, and believes that material prepared in this way loses little of its efficiency even after a year. He recommends that wine containing 14 per cent of alcohol should be used, and that the solution be kept in amber bottles. From this stock solution varying dilutions are prepared, but it is not necessary to use a definite percentage of pollen extract, as individuals differ very widely in their degrees of sensitization. The tests are carried out by making a series of superficial scratches on the skin of the arm, and gently rubbing in a drop of the pollen extract. After five to fifteen minutes the positive reactions are indicated by varying degrees of local disturbance. The first perceptible alteration is a sharply circumscribed white area around the scratch, for a distance of one-eighth of an inch. In others, the first manifestation is a reddened raised area. In more marked disturbances the swollen area is more extensive, white in the centre, but surrounded by an area of congestion. This degree is usually accompanied by itching. The intensity of the skin reaction is not always proportionate to the clinical symptoms. In children the skin disturbances are less pronounced than in adults.

The pollen extract is injected subcutaneously, the dosage being determined in the following way: The special exciting pollen is first ascertained by the skin test, and then a second series of scratches is made at a distance from the first, and different dilutions of the pollen extract in question are applied. This second test should not be applied in the vicinity of the first, as there is increased excitability of this region. The dilutions are most conveniently made by adding a certain amount of stock solution to alcohol of the same strength, so as to make a 25 per cent, a 10 per cent, or a 1 per cent or weaker dilution. The initial dose is determined by the dilution which fails to excite a definite skin reaction. The quantity of material injected should not exceed 5 or 10 drops. Before beginning the injections, it is best to wait until the reaction from the skin tests has subsided. The injections may be made at intervals of from two to seven days, increasing by a few drops at first, and later by the adoption of stronger percentages of the stock solution. To avoid anaphylactic disturbance, Goodale advances the strength at first very slowly. Hypodermic injection of the extract gives rise to a well-defined lump varying from the size of a bean to that of a pigeon's egg, accompanied by moderate

heat and itching; but the discomfort is not sufficient to cause the patient to interrupt treatment. Goodale has only had two cases of anaphylactic shock, i.e., faintness, nausea, and vomiting about half an hour after the administration of the extract. After the course of injections had been stopped, most of the patients showed a distinct diminution in the intensity of the skin disturbances caused by rubbing pollen extract into the scratch. With regard to the influence of the treatment upon the hay fever, out of 34 cases, 26 expressed themselves as having been more or less relieved. Using the precipitation reaction and the agglutination method, Goodale has shown that the botanical families chiefly concerned—the *Gramineæ*, the *Compositæ*, the *Rosaceæ*, and certain families of trees—have no sero-biological affinity with each other. Consequently an individual sensitized to one family alone would not react to the pollen of a distant group. Noon and Freeman, however, have shown that injection with one species of grass also protects against other grasses, and Goodale's own work confirms this view. In conclusion, Goodale states that pollen therapy in hay fever may be regarded at the present time as a promising method of treatment; but its value and the permanence of its results remain still to be definitely established.

Emmerich and Loew⁴ give the following directions for treatment in hay-fever cases: a hundred grams of crystallized **Calcium Chloride** is dissolved in half a litre of distilled water. Three teaspoonfuls of this are given every day at meals, the dose of calcium chloride being three grams of the crystallized salt, i.e., 1.5 grams of the anhydrous salt. The treatment should be continued throughout the year. In addition, the authors give their cases large quantities of vegetables and cheese. Emmerich and Loew report eight cases in addition to five previously detailed, all of which were very successful.

Kellogg⁵ recommends **Sodium Bicarbonate** in drachm doses, three times a day, in cases of hay fever. (See p. 33.)

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1915, ii, 655; ²*Jour. Laryngol.* 1915, 189; ³*Boston Med. and Surg. Jour.* 1915, ii, 42; ⁴*Münch. med. Woch.* 1915, Jan. 12; ⁵*N. Y. Med. Jour.* 1915, ii, 393.

HEAD INJURIES.

J. Ramsay Hunt, M.D.

Gunshot Wounds of the Head were discussed at a meeting of the Medical Society of London by Sir Victor Horsley.¹ His remarks, however, are chiefly concerned with certain special features of this subject, viz., the mechanical effects of projectiles on the tissues, based upon studies carried out on clay models, supplementing similar experiments of twenty years ago. He also presents in a very interesting form experimental data concerning the effects of velocity, size, and nature of the projectile on the soft parts, and the various characteristics of the destructive lesions which result. Sepsis, fungus cerebri, and functional disturbances of the brain are also briefly considered. His remarks on septic hernia cerebri are as follows:—

An infection of the bruised brain may present simply a localized

suppurating cavity, in which case there is no hernia. If, however, the leucocytic barrier of the cavity is imperfect and the hemisphere in consequence happens to become the seat of general cerebritis, then hernia of necessity follows; and if the mischief spreads, the hernia increases, because of the spreading infective œdema of the brain. The subdural leucocytic barrier may be quite effective in some cases, and yet the hernia increases. This was what one finds referred to very largely in the writings of the old surgeons, and in this case, undoubtedly, after some time, some of the increase is due to the development of granulation tissue in the brain that projects. Such herniæ, if the subdural barrier is good, yield completely to treatment with **Absolute Alcohol** and cutting away as the surface rapidly necroses. Various substances have been used for this purpose—for example, formalin,—but for many years he has never found anything better than absolute alcohol.

The Treatment of Cranial Injuries of Warfare is the subject of a preliminary report by Sargent and Holmes.² These observers urge rigid and even radical treatment of gunshot wounds of the brain in an early stage before sepsis has developed. If the dura mater has not been injured, it should not be incised, as this procedure increases the dangers of infection and meningitis. If the intracranial pressure is increased, as indicated by a bulging, tense dura mater and optic neuritis, the advisability of contralateral subtemporal decompression should be considered, and has been found of value in a number of cases. This procedure in an uninfected area relieves pressure symptoms without the danger of infection of the intracranial contents. In draining wounds, they have found a loose roll of thin sheet rubber to be most serviceable, it having many advantages over gauze or rubber tubing. Lumbar puncture may also be employed to reduce intracranial pressure, but should be used with discretion. In some cases they have seen meningitis follow this procedure by loosening the attachments in the neighbourhood of a fungus cerebri. Their experience with fungus cerebri is of special interest. They distinguish between a hernia cerebri and a fungus cerebri; by a fungus they mean the strangulated, disintegrated, and partly necrotic mass of brain matter which forms a cauliflower-like structure connected with the intracranial contents by a relatively narrow pedicle; while by hernia they describe the protrusion of relatively inert brain matter covered by unruptured pia mater, through an opening sufficiently large to avoid any danger of its strangulation. The chief causes of this complication are the increased intracranial pressure from the early effects of the injury, traumatic œdema, and hæmorrhage, or, in a later stage, direct septic infection and toxic œdema of brain substance projecting through an opening in the dura. (See Figs. 35, 36.)

Of somewhat special interest are *injuries of the superior longitudinal sinus*, which appear to be quite frequent. The majority are produced by rifle bullets which just graze the vertex of the cranial vault, producing a depressed fracture. This is not necessarily in the middle

line, and usually more damage is done to one side of it than to the other. In the frontal region, the upper border of the falx with the sinus may be torn across without producing the clinical picture which characterizes lesions of the sinus further back, and more particularly those which implicate the parietal lacuna. The question of operation in these cases is most difficult, for the additional damage that may be done may leave the patient worse off than if he is left alone. A certain extent of thrombosis must be assumed to exist already, and, if progressive, this leads to an increase in the symptoms, increasing intracranial pressure from the cerebral oedema, and ultimately to death. If operation is performed, the elevation of the depressed bone may at once be followed by such free hæmorrhage as to necessitate plugging, and this will almost certainly involve a complete thrombosis of the sinus, which is often fatal: on the other hand, many of these cases, if left alone, show a very decided tendency to spontaneous recovery. Such cases should be watched carefully, the scalp wound in the meantime being cleansed as thoroughly as possible. If no improvement occurs in a few days, or if symptoms of increasing intracranial pressure become manifest, and it is therefore necessary to interfere actively, the following procedure should be adopted:—

A large scalp flap is reflected, exposing the whole damaged area of bone, and with its two limbs directed laterally to allow, if necessary, of their being continued downwards later for the performance of a decompressive operation. The bone is then freely removed around the depression, leaving the depressed bone isolated but undisturbed. If, when this piece of bone is very gently removed, hæmorrhage from lacuna or sinus occurs, one is in a position to see the bleeding

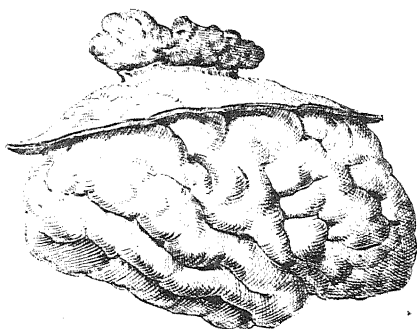


Fig. 35.—Showing a strangulated necrotic fungus projecting through an opening in the dura mater. The central cortical veins which lead to the longitudinal sinus are obstructed.

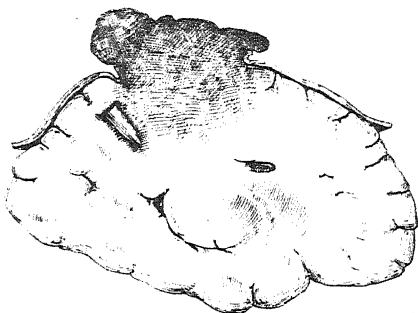


Fig. 36.—An oblique sagittal section of the same hemisphere, showing the strangulation of the protruding brain by the dural edge, oedematous softening beneath it, the existence of dural adhesions, and a rifle bullet behind the softened area.

point clearly and to control it. The sinus should not be plugged with gauze. The hæmorrhage can be arrested by applying a piece of tissue cut from the under surface of the flap, as Horsley originally suggested: if this is pressed gently down upon the bleeding point for a few minutes it will adhere firmly to the dura and control the bleeding effectually, but without obliterating the lacuna or sinus, as is almost certain to occur if gauze plugging is employed.

Chronic Subdural Hæmorrhage of Traumatic Origin, and its Relation to Pachymeningitis Hæmorrhagica Interna, forms the title of a very suggestive study by Wilfred Trotter.³ Pachymeningitis hæmorrhagica interna has long been a subject of pathological interest, and is a condition which has been found complicating cases of dementia, alcoholism, and chronic hereditary chorea. The hæmorrhage in such cases is diffuse, often bilateral, and showing signs of organization. It has usually been regarded as a low-grade inflammatory affection of the endothelial surface of the dura mater, with a tendency to hæmorrhagic infiltrations. Clinically, it has always presented great difficulties in diagnosis.

Trotter offers the very interesting suggestion that such a condition is of traumatic origin, the hæmorrhage originating from the small veins connecting the cortical circulation with the superior longitudinal sinus. He believes that while the cerebrum is protected from lateral jarring by the intervening falx cerebri, in antero-posterior concussions this protective mechanism is absent, and as a result the small veins near the sinus are torn, and slow hæmorrhage results. He cites the histories of six cases associated with head injury, although often very slight and apparently insignificant. After an interval of days or of weeks, cerebral symptoms supervene and progress very gradually, the clinical picture resulting being similar to that of the pachymeningitis hæmorrhagica interna, viz., headache, mild mental changes, and somnolence. Later, coma develops, which is characterized by intermissions and variability. Slight paresis, with rigidities and disturbance of the reflexes, are also common. Definite hemiplegia is unusual. He has observed twitchings of the limbs, but never Jacksonian epilepsy or true epileptiform attacks. In two of his patients with large clots over the left hemisphere there was no speech disturbance. Optic neuritis was present in two of the cases. The treatment consists of subtemporal exploration and removal of the blood-clots. He emphasizes the frequency of bilateral involvement, and in such cases the necessity for bilateral craniotomy.

Wilfred Trotter⁴ has also presented in monographic form the principles underlying the treatment of traumatic cerebral lesions. His handling of the subject is comprehensive, scientific, and practical, and the perusal of his article can be recommended to all who are interested in this important question. He describes in detail the physiological peculiarities of the cerebral circulation, the forms of injury to which the brain is liable, modes of action of cerebral injuries and the resulting clinical types, and indications for operation.

Subtemporal Decompression, Unilateral and Bilateral, as a Treatment for Intracranial Injuries, has been advocated by many surgeons in recent years. This operation has much to recommend it in fractures of the base of the skull with symptoms of cerebral compression, viz., coma, bradycardia, stertor, and optic neuritis, its object being to relieve the brain of pressure, by allowing the escape of blood-clot, softened brain substance, and cerebrospinal fluid, and leaving a permanent decompression opening in the skull. It is held by many that the late results are more favourable in cases which have been relieved in this way and are not allowed to recover with a 'closed skull.'

V. P. Blair³ presents his results with this method of treatment, which he strongly endorses, and offers experimental evidence in support of this view. In a series of 63 patients with unlocalized intracranial injuries, not subjected to decompressive measures, only 35 per cent survived. In a series of 42 patients who were decompressed, 57 per cent survived. He believes that time is an important factor, and that early relief of pressure is indicated. The temporal route has the great advantage of exposing the distribution of the middle meningeal, which would permit ligation in cases of rupture of this vessel or its branches. Suboccipital decompression is a much more serious procedure, and is not indicated, as the lesions are usually supratentorial.

REFERENCES.—¹*Brit. Med. Jour.* 1915, i, 321; ²*Ibid.* 537; ³*Brit. Jour. Surg.* 1914, Oct. 271; ⁴*Ibid.* 1915, April, 520; ⁵*Jour. Amer. Med. Assoc.* 1914, ii, 863.

HEART, CONGENITAL MALFORMATIONS OF.

Carey Coombs, M.D., M.R.C.P.

C. H. Dunn¹ gives a very useful analysis of 48 autopsy cases of cardiac anomaly, 40 diagnosed during life and 8 discovered post mortem. Of these latter, all were examples of patent foramen ovale, one of them showing a small deficiency of the septum ventriculorum also. Of the 40 other cases, 24 exhibited pulmonary stenosis, associated in seven with ventriculo-septal deficiency and in one with an open ductus arteriosus. Including this last case, there were not less than 11 examples of patent ductus, all but two being associated with a deficiency of the septum ventriculorum.

DIAGNOSIS.—Dunn's useful generalizations are: (1) Cases with bruit, cardiac enlargement or palpable thrill, or both, and cyanosis are likely to be examples of pulmonary stenosis. If the lesion be pure the child dies in infancy. Survivors have some second lesion, a patency of either the septum ventriculorum or of the ductus arteriosus. If the bruit has not the continuous character or the transmission into the arteries of the neck which are such suggestive indications of a patent ductus, the case is one of patent interventricular septum associated with pulmonary stenosis. (2) If there be a bruit and the heart be enlarged, but without cyanosis, the case is

one of interventricular communication, with ductus patency if the signs mentioned above point in this direction. (3) Murmur, without cyanosis or cardiac enlargement, points to patency of the ductus arteriosus, especially if it be of the humming-top type, and audible over the carotids.

PROGNOSIS.—The lesion that interferes most with nutrition, and therefore constitutes the most definite threat of early death, is stenosis of the pulmonary artery. Other lesions are relatively benign, especially patency of the ductus arteriosus. In this form the patient grows up well. [If not too much fuss be made of the presence of a bruit. The writer has seen several examples of this abnormality in which too much attention to the heart has overwhelmed the child in an atmosphere of invalidism.—C. C.]

REFERENCE.—¹*Amer. Jour. Dis. Childr.* 1914, viii, 185.

HEART, DISEASES OF. (*See also* ANEURYSM; AURICULAR FIBRILLATION; HEART, CONGENITAL MALFORMATIONS OF; HEART, SYPHILIS OF; PERICARDITIS; PULSE, IRREGULAR; RHEUMATIC HEART DISEASE; SOLDIER'S HEART; TOBACCO HEART.)

Carey Coombs, M.D., M.R.C.P.

ETIOLOGY.—Cabot¹ has analyzed a group of 600 hospital cases of organic heart disease with reference to etiology. As he points out, a diagnosis of 'mitral regurgitation' is no real diagnosis at all. To write a case down thus is to name it, not etiologically as is the rational plan, but after the main symptoms. He urges that cardiac terminology should be placed on an etiological basis, for the sake of accuracy in diagnosis, prognosis, and treatment. He concludes that "93 per cent of cases of failing heart group themselves without much resistance into four classes: rheumatic (streptococcic), syphilitic, arteriosclerotic, and nephritic. About 5 per cent cannot easily be thus classified. The remaining 2 per cent are 'goitre' hearts. In the 278 rheumatic cases, females predominate: 170, or 61 per cent, to 108 males, or 39 per cent. Sixty per cent of these rheumatic cases began before the twenty-second year. The typical rheumatic heart patient is therefore a young girl. Of the 74 syphilitic cases, 70 per cent were in men; only 30 per cent in women. The typical syphilitic heart patient is a middle-aged man (average age 47), with aortic regurgitation and no rheumatic history. The 93 arteriosclerotic patients averaged 59 years of age. The 117 glomerulonephritic patients averaged 36 years. The arteriosclerotics are therefore twenty-three years older than the nephritic. The sexes are about equally represented in the two groups. Diagnosis, prognosis, and treatment are put on a more rational basis if we give up the terms 'myocarditis,' 'cardiorenal' disease, 'aortic regurgitation,' 'mitral regurgitation' or qualify them with an adjective like 'syphilitic,' 'rheumatic,' or 'arteriosclerotic.' Practically all the stenoses belong in the rheumatic group."

Effect of Exercise on the Heart.—Spencer Williamson,² utilizing

teleröntgenography, finds that in normal and some pathological hearts the immediate effect of exercise is not dilatation but contraction of the heart. It was only in a small group of definitely diseased hearts that any dilatation was observed.

Lee, Dodd, and Young³ examined the hearts of rowing men at Harvard by the same method. They sum up by saying that they could find very little difference in the size of the heart in men who had been rowing for two to four years and that of men who had been rowing over ten years.

Traumatic Endocarditis.—Webber⁴ describes two cases in which severe injury to the chest was followed by the development of the symptoms and signs of valvular disease of the heart, and quotes other examples from the literature.

SYMPTOMS.—Goodhart⁵ records cases which exemplify the occurrence of dextrocardiac bruit, arising at the tricuspid and pulmonary valves, in mitral stenosis. That tricuspid systolic and pulmonary diastolic murmurs may be heard in such cases is, of course, well known. His point is that such murmurs may occur in mitral stenosis when the sounds characteristic of that lesion are absent, to the confusion of the diagnostician if he be not forewarned of this possibility.

Gunson⁶ has made a careful study of the *oculo-cardiac reflex* (see MEDICAL ANNUAL, 1915, p. 323) in children, and arrives at some important conclusions. His investigations were based on a routine application of the polygraph, during which the reflex was elicited. "Pressure on the right eye was . . . exercised by the thumb, through the closed upper lid. The amount of pressure used was the maximum that could be excited without causing the patient pain. The pressure was kept up for half a minute in the majority of cases, and the pulse-rates were calculated over this period." From these researches he concludes that "the reflex affords a simple means, under certain conditions, of acting upon the nervous mechanism of the heart in such a way as to produce all the changes in rate, rhythm, and conduction which follow vagus pressure in the neck. Under other conditions results analogous to those induced by stimulation of the sympathetic are obtained. The reflex is positive when slowing of the pulse occurs, and negative when either no slowing or actual quickening results. Persons exhibiting the former state are described as vagotonics, those exhibiting the latter as sympathicotonics. It is positive in normal persons, and in about 92 per cent of children convalescent from diphtheria and scarlet fever. In about 8 per cent the reflex is negative; these children are of a naturally nervous disposition. In some of the patients the reflex was negative during pyrexia. In cases of so-called 'cardiac paralysis' it was negative, and remained so till death, in fatal cases. In cases which recovered, the reflex became positive when the heart returned to the normal state. In cases of diphtheria and scarlet fever in which the reflex was positive, the following results were obtained: (1) Slowing of the whole pulse, with

stoppage of the heart, in some cases for as long as four seconds ; (2) Production of premature contractions in cases in which they were previously absent, and an increase in the incidence of the premature contractions when they were previously present ; (3) Reduction of the $a-c$ interval ; (4) Production of $c + a$ beats, due in some cases possibly to escape of the ventricle, in other cases presumably to the inception of atrioventricular rhythm ; (5) (In diphtheria patients only) complete dissociation of auricles and ventricles.

"The claim that the oculo-cardiac reflex is of diagnostic value in differentiating cardiac failure due to myocardial lesions from that due to nervous lesions, presumes the independence of the muscular and nervous functions of the heart and cannot be upheld." In spite of this, however, it seems probable that application of this test may prove to be of definite clinical value in the future.

Schoonmaker⁷ describes his *test of myocardial efficiency* and its results. This should be compared with the work of Martinet (*see SOLDIER'S HEART*). First he takes the pulse-rate, and the systolic and diastolic pressures with the patient lying down. The same data are then noted with the patient standing up after walking about a hundred yards about the room at an ordinary speed. An increase in systolic pressure with a stationary or increased pulse-pressure (i.e., the difference between the systolic and diastolic pressures) he regards as suggestive of fairly good myocardial efficiency. A decrease in systolic pressure, together with a decrease in pulse-pressure, is suggestive of poor to bad myocardial efficiency.

PROGNOSIS.—In the paper already quoted from,⁵ Goodhart gives data to support the contention that patients with mitral stenosis may live for many years and survive into the seventh decade.

TREATMENT.—Goodhart's article also contains some hints as to the treatment of mitral stenosis. He says that such hæmorrhages (uterine, pulmonary, and so on) as may occur in these cases should not be checked, since they tend to the relief of the circulation. The dry diet usually prescribed is, he thinks, a mistake ; plenty of fluids should be allowed. Rest in bed should be avoided and postponed as far as possible, since it initiates the stage of final breakdown.

Christian⁸ discusses the use of **Digitalis** in heart disease. In common with most modern observers, he discovers the chief indication in cases of auricular fibrillation with total arrhythmia. In this condition, one of the best methods of watching the action of the drug is to observe the 'pulse deficit,' i.e., the difference between the number of heart-beats as measured with the stethoscope and the number of pulse-beats as counted at the wrist. This discrepancy should decrease if digitalis be acting successfully, for it should cause a greater proportion of the heart-beats to 'reach the wrist.' He regards nausea, and bigeminy of the pulse, as two of the most reliable evidences of digitalis saturation. The diuretic effect of the drug is enhanced if it be combined with **Theocin**. Christian also supports the use of **Digitalis** in auricular flutter, and in cases with an alternating pulse. The

preparations he favours are the powdered leaves and the fresh infusion. For hypodermic injection he uses **Liquid Digipuratum**. When vomiting contra-indicates digitalis, he injects **Strophanthin** intravenously, with due regard for the amount of digitalis which the patient may have taken already. Finally, he advises the prescriber to use one or two preparations only of digitalis, and says that it is well worth while to have all one's digitalis prescriptions made up at one druggist's, to ensure reliability in the preparation. (*See also p. 15.*)

Shattock⁹ insists on the importance of treating cardiac disease with due respect for its causation. He lays stress on the value of **Potassium Iodide** in some cases of cardiac syphilis. To lessen the cardiac load he advises free dosage with **Hydragogue** purgatives. **Bleeding** and **Leeching** answer the same purpose. He speaks highly of the diuretic effect of **Calomel** in 3-gr. doses every four hours, though, as he observes, much smaller quantities than these may damage the gums of a nephritic. **Diuretin** is useful temporarily in cardiac, but never in renal, dropsy.

Newburgh¹⁰ made a most careful research into the value of **Strychnine** in eight cases of cardiac disease with broken compensation. His conclusion is that the drug had not the smallest value even in cases where a subsequent successful reaction to digitalis medication proved them amenable to treatment.

Lueblin¹¹ has made observations on the cardiotonic action of **Pituitrin** in a limited number of cases. In a majority it acted favourably, the size of the dilated heart being appreciably reduced in a short time. Usually a single dose of 1 c.c. was administered by subcutaneous injection. In patients with pronounced arteriosclerotic changes it is contra-indicated.

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1914, ii, 1461; ²*Amer. Jour. Med. Sci.* 1915, i, 492; ³*Boston Med. and Surg. Jour.* 1915, ii, 499; ⁴*Ibid.* 1914, ii, 517; ⁵*Lancet*, 1915, ii, 7; ⁶*Brit. Jour. Childr. Dis.* 1915, 97; ⁷*Amer. Jour. Med. Sci.* 1915, ii, 582; ⁸*Boston Med. and Surg. Jour.* 1915, ii, 306; ⁹*Ibid.* 316; ¹⁰*Amer. Jour. Med. Sci.* 1915, i, 696; ¹¹*Boston Med. and Surg. Jour.* 1914, ii, 962.

HEART, SYPHILIS OF.

Carey Coombs, M.D., M.R.C.P.

TREATMENT.—Brooks and Carroll¹ complete their studies of cardiac syphilis with a paper on its treatment. The essential lesion, they say, is a peri-arterial granulomatous inflammation affecting the cardiac muscle, and it is mainly by overcoming this that the symptoms are relieved, though they agree that valvular disease due to syphilis may be cured by specific treatment. Twenty-four of their cases were examples of infection of the heart during the secondary stage of syphilis, the remainder (277) being later cases. Emphasis is laid on the absolute necessity of vigorous and continued antisyphilitic treatment. The aim should be to destroy the infection itself rather than to bolster up the injured heart by cardiac measures. They claim that this plan of action has achieved permanent improvement, if not

actual cure, in more than one-third of their cases. "The most satisfactory treatment is one which combines the use of **Salvarsan** with **Mercury** and the **Iodides**. Combined treatment may be unnecessary in early cases, but is essential in late ones. Salvarsan, preferably old salvarsan, produces in most instances the quicker results. It is capable, however, of inducing serious symptoms, and in untried cases of heart involvement it should be given in small doses until its action has been ascertained." They give mercury in various forms, orally, by intramuscular injection, by inunction, and even by the old vapour method. Some cases are benefited by one of these methods, others by another, and in most instances it is worth while to vary the plan from time to time. Mercury should be given in all well-established cases, combined as a rule with salvarsan at wide intervals. The iodides are "valuable adjuncts . . . especially in late cases," but they seem to have no spirillicidal action. In late cases, permanent injury is probably established, even though treatment appears to be successful. For this and other reasons treatment must as a rule be continued, at intervals, throughout life.

Anderson² describes a case of spontaneous rupture of the ventricular wall in a child, age 5, due to degenerative myocardial changes consequent on inherited syphilis.

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1914, ii, 1456; ²*Lancet*, 1915, i, 648.

HEART, WOUNDS OF.

W. I. de C. Wheeler, F.R.C.S.I.

E. H. Poole and M. A. Ramirez¹ report the result of a case of heart suture three years after operation. The patient stabbed himself with a knife in July, 1911. There was a wound about half an inch in length in the fourth intercostal space to the inner side of the nipple. Great shock and the symptoms and physical signs made it reasonably certain that there was a wound of the heart, which was exposed by making a vertical incision over the sternum carried outwards along the lower margin of the third costal cartilage. The cartilages of the third and fourth ribs were divided close to the sternum, and were lifted up from the pleura. By fracturing them at their juncture with the ribs a trap-door was formed. The internal mammary artery was ligatured. The existing wound in the pericardium was enlarged. At this stage hæmorrhage was free. The wound in the heart could be felt with the tip of the index finger. With the finger as a guide, a vaselined silk suture was passed on a fine intestinal needle and left long. Gentle traction on this suture lifted the heart so that the wound was visible and accessible. It involved the left margin of the heart somewhat posteriorly; it was about $\frac{1}{2}$ in. long, situated transversely and just above the apex. Blood gushed out whenever the finger was momentarily lifted in order to pass a stitch. Five were inserted. The pericardium was closed with interrupted catgut stitches. A drain was inserted down to the sutured pericardium. The course of the case is recorded from day to

day in a very exact manner. A subsequent x-ray report gives the heart as normal in size, state, and situation, with no trace of indentation or broken outline.

The paper concludes with an attempt to record the late results of the reported cases of recovery after heart suture. Twenty-one cases have been traced. Sixteen were operated upon within four hours of the injury. In the majority, the left ventricle was wounded, but there are instances of wounds of the other three cardiac cavities. Poole and Ramirez arrive at the conclusion that in all successful cases the general condition of the patients was apparently normal a long period after operation. Arduous work was performed without discomfort. It is noteworthy that in these cases suppurative pericarditis did not occur as a post-operative complication. The following complications and sequelæ were noted: Pneumonia 5, empyema 3, serous pericarditis 4, pleurisy (non-purulent) 5, pneumothorax 1, marked dyspnoea 1, no complications 9.

REFERENCE.—¹*Amer. Jour. Med. Sci.* 1915, ii, 335.

HEMIPLEGIA, ACUTE. (*Vol.* 1915, p. 329.)

HERNIA.

E. Wyllys Andrews, M.D., F.A.C.S. (Chicago.)

Relation of Hernia to Workmen's Compensation Law.—Moscowitz,¹ of New York, discusses the relation of the workmen's compensation law of 1914 in that State. Those engaged in hazardous employments are entitled under this Act to compensation for injuries sustained. In most instances there is no question of the validity of the claim, but in others the injury is not so manifest. It appears also that claims are made in perfectly good faith for a malady the result of an injury, not properly to be regarded as the result of trauma. The relationship of injury to hernia is important and difficult. Originally the etiology of hernia was thought to be tearing of the peritoneum; hence the term rupture, which dates back to the time of Celsus. This theory assumes that intra-abdominal pressure under violence causes escape at some weak point. Another theory is that the inadequate fixation of the abdominal viscera is the real cause. Still another theory presumes that a peritoneal prolongation is always present preceding a hernia. Only recently has the congenital theory of hernia been universally accepted. Definite proof is lacking that this congenital factor is universal. The writer regards it as regrettable that the congenital theory cannot be accepted as always valid. It would for ever terminate all discussions, and remove difficulties in the working of compensation laws. His definition of all hernias except a rare form of sliding hernia is, "A hernia is a protrusion of an intra-abdominal viscus into a preformed sac of peritoneum, the sac being an essential *sine qua non*." Thus the congenital element is the prime, though not the only, etiological factor. It seems, therefore, that traumatic hernia, if it exists, is exceedingly rare. Most usually it does not occur at the site of normal hernial openings.

Non-traumatic hernia is frequent, and occurs at certain predestined locations, caused by weak areas in the intra-abdominal fascia. Workmen's compensation commissions should be required to place implicit reliance on surgeons' opinions in these cases.

A New Method of Treating the Hernial Sac.—Buckley² describes a method of dealing with the sac of femoral hernia, which he has employed successfully in thirty cases. The procedure begins with the isolation of the sac up to the ring. An incision is made through the external oblique muscle, parallel to its fibres, exposing the conjoined tendon. An opening is made with scissors at the apex of the sac and the contents are reduced. With the finger or Kocher's hernia forceps the sac is now forced outward through the inner ring to the upper incision, where its edges are caught and held, thus drawing it

inside out. The slit in the aponeurosis of the external oblique is closed with continuous catgut, after which the pectineus muscle is sutured as usual to the edge of Poupart's ligament. (See Fig. 37.)

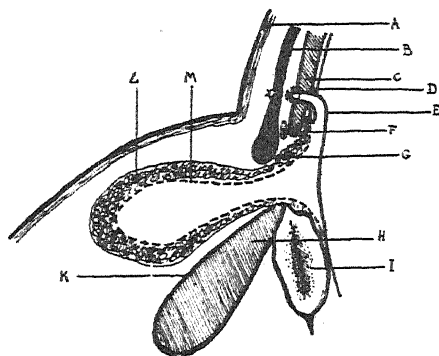


Fig. 37.—Diagram showing sagittal section through crural canal and femoral hernial sac, and demonstrating the sac before and after invagination. A, Skin. B, Aponeurosis of external oblique. C, Internal oblique and transversalis conjoined. D, Parietal peritoneum. E, Invaginated sac ligatured and fixed. F, Spermatic cord. G, Poupart's ligament. H, Pectineus muscle. I, Horizontal ramus of pubis just external to symphysis. K, Pectineal fascia. L, Fatty covering of peritoneal sac. M, Sac in situ before invagination.

Preservation of the Iliohypogastric Nerve in Operation for Inguinal Hernia is discussed by Dowd.³ In modern methods, Bassini, Andrews, Coley, Dowd, and others report only between 2 and 3 per cent relapses, whereas, prior to Bassini's work, failure occurred in 27 to 50 per cent. Preservation of the nerve-supply is believed by Dowd to be an important element in

this repair. The twelfth dorsal, the iliohypogastric and the ilio-inguinal nerves curve around the lower part of the abdomen, carrying both motor and sensory fibres. The iliohypogastric gives off motor fibres to the transversalis, internal and external oblique, and rectus muscle, and also influences their nutrition. The iliohypogastric nerve runs directly across the operative field (*Plate XXIV*), and is frequently cut by operators. While this is unimportant, as a rule, the small number who are likely to have recurrences are the very ones to be injured by its loss, as their muscles are thereby rendered more atrophic, especially if we seek union between alien structures, such as the internal oblique muscle and Poupart's ligament. The nerve is large, and can easily be seen making its way between the aponeurosis of the external oblique muscle and the internal oblique.

PLATE XXIV.

INGUINAL HERNIA: PRESERVATION OF THE ILIOHYPOGASTRIC NERVE IN OPERATION

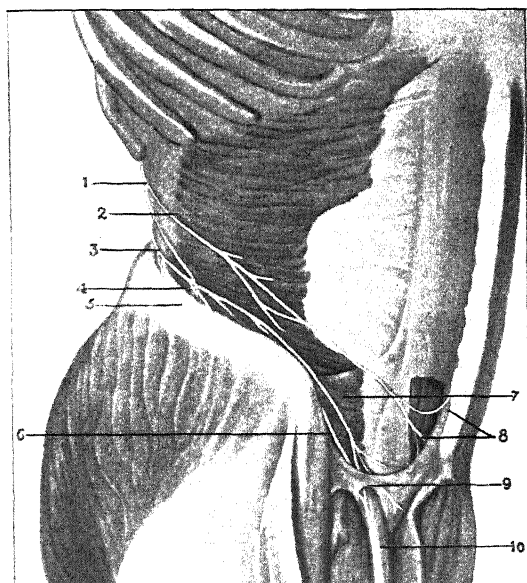


FIG. A.—Nerve supply of the lower part of the abdominal wall (adapted from Spalteholz). (1) N. intercostalis XII; (2) M. transversus abdominis; (3) N. iliohypogastricus; (4) Ramus muscularis; (5) Ramus cutaneus lateralis n. iliohypogastrici; (6) N. ilio-inguinalis; (7) M. obliquus internus abdominis; (8) Ramus cutaneus anteriores n. intercostalis XII; (9) Annulus inguinalis subcutaneus.

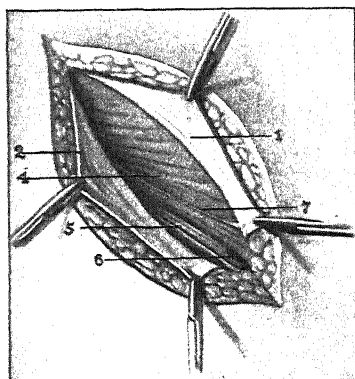


FIG. B.—(1) Aponeurosis of external oblique muscle turned upward; (2) Aponeurosis of external oblique muscle turned downward; (3) Internal oblique muscle; (4) Ilio-inguinal nerve; (5) Cremaster muscle; (6) Ilio-inguinal nerve; (7) Iliohypogastric nerve.

Redrawn from 'Annals of Surgery.'

Too little attention has been paid to the preservation of this nerve, which is large enough to be seen easily. In lapping the aponeurosis of the external oblique by the Andrews method, Dowd thinks the redoubling of layers may be a bar to reunion of nerve fibres.

Free Transplants of Fascia Lata are constantly coming into favour in reinforcing hernia operations of all sorts, especially atypical large rings, or those in which previous operations have destroyed the landmarks. Andrews employs one large triangular flap covering both sides in double inguinal hernia. Mann⁴ reports the use of such transplants in closing large defects, such as ventral or umbilical hernias. Some-

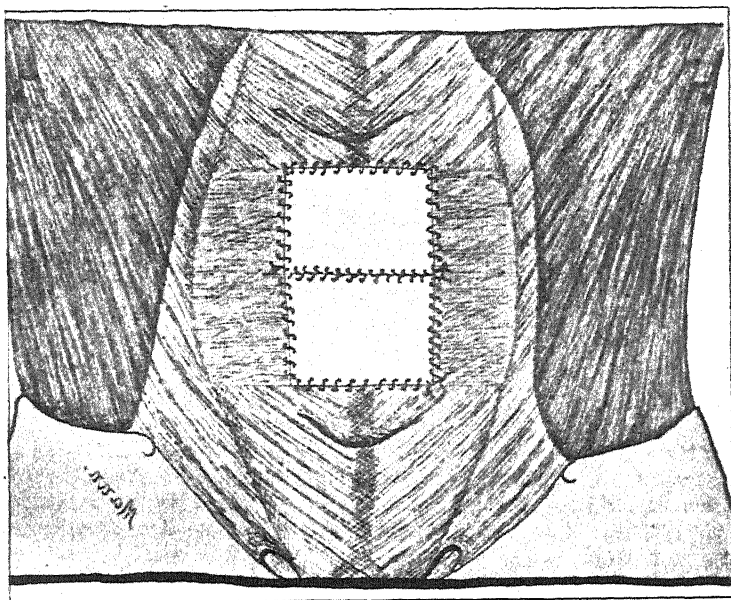


Fig. 38.—Umbilical or ventral hernia. The two free transplants of the iliotibial band of the fascia lata sutured transversely across the repair.

times these rings are so large that they cannot possibly be drawn together without some flap method. Flaps of the anterior rectus sheath can be used to supplement the defects in the lateral walls, but with free transplants of such strong layers as the fascia lata, the rectus sheath flaps can be supplemented or avoided altogether. Fig. 38 shows a large umbilical or ventral hernia closed by two such flaps.

G. Grey Turner⁵ reports the end results of 720 operations on hernia of all varieties, with a mortality of 36, or 5 per cent. Of these, 151 were strangulated, with 31 deaths, or 21 per cent mortality. Of

simple radical-cure operations, there were 567, with 5 deaths, or 0.87 per cent. The proportion of cases was :—

Inguinal ..	389	..	3 deaths	..	0.77 per cent
Femoral ..	64	..	0	..	—
Umbilical ..	43	..	1	..	2.32
Ventral ..	66	..	1	..	1.51
Other varieties ..	7	..	0	..	—

Turner insists on the importance of high amputation of the sac in radical cures, as well as all the modern steps of the perfected newer methods. Inguinal hernia in women requires very slight variation in the technique. In femoral hernias he advocates reducing the stump of the sac into the extraperitoneal tissue, then fixing Poupart's ligament to Cooper's ligament with stout catgut. Umbilical hernias differ widely among themselves, but are usually cured permanently by careful suturing, especially by the transverse closure of Mayo.

Retroperitoneal Hernia, which is seldom discovered before operation, has been successfully treated by Short, of Bristol.⁶ Reporting one successful case of hernia at the ileocaecal fossa, Short finds that in his case the fossa was one hitherto undescribed, being a cavity outside the caecum and behind it, opposite the ileocaecal valve. The previously described pouches are four : the retrocolic fossa, the ileo-appendicular fossa, the fossa of Hartmann, and the fossa iliaco-subfascialis.

REFERENCES.—¹*Med. Rec.* 1915, Apr. 3 ; ²*Lancet*, 1914, Dec. 19 ; ³*Ann. Surg.* 1915, i, 204 ; ⁴*Ibid.* 1914, ii, 481 ; ⁵*Med. Press and Circ.* 1915, i, 608 ; ⁶*Brit. Jour. Surg.* 1915, July, 48.

HERPES ZOSTER.

E. Graham Little, M.D., F.R.C.P.

Rosenow and Ortedal¹ claim to have produced experimentally eruptions of herpes zoster and corresponding lesions in posterior-root ganglia in rabbits by the intravenous inoculation of bacteria in emulsions obtained from extirpated tonsils, of mixed and pure cultures of streptococci from tonsils and pyorrhoeal pockets, and streptococci in pure culture from the spinal fluid, derived in most cases from patients with marked eruptions of herpes zoster, but in some instances from patients suffering from herpes simplex. The authors state that "Gram-staining diplococci and short chains were constantly found in the areas showing lesions in and about the ganglia," and deduce the inference that organisms isolated from herpetic patients tend to localize electively in the ganglia. The experimental eruptions occurred chiefly within four days of the inoculation, and were found on the skin, tongue, and lips. [Their identification with true herpes zoster seems, however, to be at least dubious.—E. G. L.] Peripheral vesicles were sterile in the human subject.

Graham Little² reports an apparently unique instance of a synchronous double eruption of herpes zoster, occurring in the third and eighth dorsal segments on the same side of a boy, age 11. The skin between the affected segments remained completely unaltered. The same writer³ records an eruption of herpes zoster occurring in a

boy who was recovering from an attack of dermatitis herpetiformis, which was treated with arsenic. When the eruption of dermatitis herpetiformis had practically disappeared, an unmistakable eruption of herpes zoster was noted in the eighth left dorsal segment.

Parkes Weber¹ records a very unusual case of a sudden paralysis of the left arm in a man, age 64, followed a week later by a typical eruption of herpes zoster on the left side of the head and neck, the left clavicular region and shoulder, and upper and anterior wall of the left chest. The patient gave a strongly positive Wassermann reaction. Seven weeks later there was little if any muscular atrophy of the arm, but a slight contracture of the paralyzed hand. Nowhere else was there paralysis or anaesthesia. The cases in which the sequence of paralysis followed by herpes zoster was observed are even less frequent than those in which herpes zoster may be followed by paralysis, usually of a part near the site of eruption. Both types of this syndrome are rare.

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1915, i, 1968; ²*Brit. Jour. Derm.* 1915, 135; ³*Ibid.* 238; ⁴*Ibid.* 408.

HODGKIN'S DISEASE. (See LYMPHADENOMA.)

HYDROPHOBIA. (*Vol.* 1915, *p.* 335.)

HYPERTRICHOSIS.

E. Graham Little, M.D., F.R.C.P.

Geyser¹ has used X-ray treatment extensively, and advises that when a covered part of the body is treated (and it is somewhat extraordinary to note how frequently he was called upon to remove the axillary hair, a frequency which he ascribes to a fashion of evening dress which exposed that area), massive doses should be given to the point of causing a marked erythema, usually appearing after the second to the fourth exposure. He further recommends a repetition of the treatment after ten days' to two weeks' interval, when the erythema will have usually subsided. For the face, small doses are advised, frequently repeated until a slight erythema shows itself. All this is opposed to English precept and practice, and the author seems to accept burns, which it is not surprising to read sometimes occurred, very light-heartedly. Even with these risks, re-growth of hair took place in about 18 to 20 per cent of the cases.

REFERENCE.—¹*Jour. Cutan. Dis.* 1915, 520.

ICTERUS NEONATORUM.

Frederick Langmead, M.D., F.R.C.P.

William E. Spiller¹ refers to an interesting family reported by Pittfield, which demonstrates that severe icterus in the newborn may be indicative of a condition which in turn is responsible for arrest of development in the brain. Intracranial hæmorrhage may be produced by some abnormal condition of the blood which may cause hæmophilic jaundice, but all severe jaundice in new-born children is not necessarily of this nature, and conditions other than hæmorrhage may cause arrest of cerebral development. The family described by

Pitfield was one of four children. The first became jaundiced soon after birth, vomited black material, and passed tarry stools. Jaundice became so intense that death was expected, but he ultimately recovered completely. The second child became icteric on the third day; subdural hæmorrhage was suspected on account of coma and convulsions, but recovery occurred. At five years of age the child could hardly walk and was mentally defective. An operation revealed dural adhesions over the cerebellum. The third child was icteric at birth, and became profoundly so when forty-eight hours old. He died from subdural hæmorrhage before he was seventy-two hours old. A fourth child became jaundiced a few hours after birth, but the process was arrested by the injection of blood-serum from another person.

The relation between disease of the liver and alteration of the brain has received much attention in recent literature. Schütte observed a progressive disease of the central nervous system. At autopsy the liver was found to be much diseased, and the brain showed extensive destruction of nerve fibres and cells, and overgrowth of neuroglia, especially in the frontal lobes. Schütte believed that the conditions of the liver and the brain were related, as is the case in 'progressive lenticular degeneration' described by S. A. K. Wilson. Fleischer and Völsch have reported a condition in which pigmentation of tissue, especially of the edge of the cornea, is associated with cirrhosis of the liver, and which is allied to the pseudo-sclerosis of Westphal and Strümpell. Bostroem, in reporting a case of pseudo-sclerosis, comes to the conclusion that the changes in the neurone cells and the overgrowth of neuroglia, as well as the alteration of the liver, are caused by intestinal intoxication, dependent upon a functional disturbance of the alimentary tract.

This connection which has been noted between disease of the liver and cerebral defect bears upon Spiller's own cases. These were of four children with cerebral diplegia, each of whom had suffered in early infancy from severe jaundice, to which the parent ascribed the nervous disease. The jaundice lasted for three days, six weeks, several weeks, and for three months respectively. Labour was normal in every case except one, in which it was premature.

REFERENCE.—¹*Amer. Jour. Med. Sci.* 1915, i, 345.

INCONTINENCE (IN WOMEN).

Bryden Glendining, M.S., M.B., F.R.C.S.

The many cases of incontinence in women where no obvious lesion, either in the form of cystitis or prolapse, is noted on examination, often require some operative treatment. The incontinence is usually the late result of obstetrical or surgical injury, and only becomes manifest in its early stages through some sudden exertion or coughing when standing, with the result that there is an escape of urine. Newman's¹ operative measures are directed to diminishing the lumen of the first three-quarters of an inch of the urethra. A straight metal bougie with

a distinct knob at the end is introduced into the bladder, and then withdrawn so that the expanded end comes down to and localizes the neck. He then lays bare a triangular area over the internal sphincter and base of the bladder, and plicates the muscular and fascial structures in order to reinforce the outlet. With this method he has had considerable success.

REFERENCE.—¹*Lancet*, 1914, ii, 940.

INFANT FEEDING.

Frederick Langmead, M.D., F.R.C.P.

Wet Nursing.—In hospital practice the high mortality among infants is undoubtedly to be accounted for partly by their lack of human milk. F. S. Churchill¹ shows how this may be avoided. The staff of the Children's Memorial Hospital, Chicago, have, for a period of five years, resorted to the use of human milk in their management of the hospital infants. Wet nurses have been employed. Each nurse brings her own baby with her, and both mother and baby are examined before being engaged, the examination of the mother including the Wassermann test. In addition to her duties as a foster mother, the nurse does general work in the hospital. The mother nurses her own baby every four hours, usually at one breast. The other breast is pumped at the end of the alternate four hours, the mammæ being thus stimulated to activity every two hours. The milk obtained thus is given by the bottle to the ward babies, none of the latter being put to the breast for fear of infecting the mother—e.g., with latent syphilis. This method also allows of definite amounts of breast-milk being given to a baby. Except in the case of premature infants, few of the babies receive breast-milk exclusively, but are on mixed feeding—part human and part bovine milk. The bovine milk is gradually increased as the infant improves, preparatory to its being sent home. As a rule the milk from all the nurses is mixed, but in some cases babies with a particularly weak digestion receive the milk from a single nurse, one whose milk has been shown by analysis to be 'poor'; or such a baby is given 'fore-milk.' The amount of breast-milk furnished by each nurse varies considerably. During the first few days each yields on an average 8 to 10 oz. daily, in addition to that given to her own baby. This increases rapidly until the maximum is reached, which ranges from 16 to 60 oz. per day. The average duration of activity of the wet nurse has been from nine to ten months; the maximum, thirteen months. The nurses go to the hospital first when their own babies are about a month old.

The mortality in 715 cases was 36.7 per cent, that among the breast-fed babies 36.3 per cent, that among the babies fed on cow's milk alone 36.9 per cent. The mortality, therefore, did not appear to be influenced by the method.

Boiled Milk.—The discussion as to the relative values of boiled and unboiled milk still continues. As R. H. Dennett² points out, some of the animal and test-tube experiments, although instructive and

interesting, do not throw any real light on the practical problem of infant feeding. For instance, whether calves do as well on boiled cow's milk as they do on unboiled, and whether babies do as well on boiled or unboiled human milk, does not directly affect the question. At best, feeding babies with cow's milk is an artificial procedure, and such experiments should not be allowed to confuse us. Many clinical observers, notably Budin, have stated that the prolonged use of boiled milk does not lead to constitutional disturbances such as rickets, anæmia, malnutrition, poor musculature, or scurvy. Finkelstein is quoted by Morse as saying that there was no evident difference in the results with raw and boiled milk in 60 healthy and 53 ailing babies. J. Lane Claypon, from experimental evidence and from personal observation of the conditions met with not only in British clinics but in those of America and the chief Continental centres, arrived at the conclusion that the nutritional value of boiled milk is somewhat higher than that of unboiled. Dennett has observed a series of eighteen cases of infants who were fed on boiled milk for a considerable period. These were infants who suffered from digestive disturbance as soon as the boiling of the milk was stopped for a few days, or of infants who were progressing so well on boiled milk that he hesitated to replace it by unboiled. The duration of boiling was for three minutes. None developed rickets, all showed a marked improvement in nutrition and musculature, and, with one exception, they grew into normal infants. The condition of the skin, the hair, the colour, the general alertness, and sense of well-being were exceptionally good. (From one who had formerly had experience with unboiled milk feeding, this opinion is interesting.) Scurvy did not develop in any, possibly because orange-juice was given daily.

It is commonly stated in America that if unboiled milk be replaced by boiled milk in infant feeding, digestive disturbances arise. Dennett found that this was not so, but that, on the contrary, such disturbances, if present, disappear. If, on the other hand, the boiled milk be replaced by unboiled, Dennett found that, in a few cases, intestinal dyspepsia and diarrhœa followed within three or four days. He relates an interesting experience with thirty-six babies suffering from gastro-enteritis, who were being bottle-fed at the New York Post-graduate Hospital. Boiled milk was given, and no curds were present in the stools of any of them. The boiling was stopped, and in nearly every instance curds appeared. Three days later the boiling was recommenced, and within twenty-four to thirty-six hours the stools were again free from curds.

Among the disadvantages which have been thought to accrue to boiled milk is constipation. Of 31 babies who were constipated at some time while they were receiving boiled milk, in 19 the constipation was overcome by adding sugar, or increasing the strength of the feed; in 6 it was relieved by stopping the boiling, and in 6 others the constipation persisted in spite of the change from boiled to un-

boiled milk. His inference is, that though probably boiled milk is more apt to produce constipation than unboiled, in certain cases the constipation may be overcome without stopping the boiling, but does not necessarily cease when that is done.

Whole Milk.—H. C. Mann³ gives his experiences with undiluted citrated milk. From a trial extending over eight years, he asserts with confidence that if this method were adopted when breast milk has failed or proved unsuitable, rickets, as a disease with many complications dangerous to infant life, would disappear. (Some American writers have stated that it produces rickets.) During this period hundreds of children had been fed in this way, and in many cases their subsequent growth and development had been watched past the age of beginning school, and into the years of the second dentition. In most cases the wasting for which the babies were brought to the hospital arose as follows: The breast-milk having failed, the baby was fed for a few weeks on diluted cow's milk, and failed to gain, or perhaps lost, weight. A change was then made, either to a condensed milk which contains a high percentage of carbohydrate, or to a dried milk which may supply the constituents in the correct percentage, but which contains fat in the form of an emulsion that does not prove easy of digestion. In the former case the mixture is deficient in fat, and also the child is likely to develop an intolerance for sugar; in the latter, various forms of fat dyspepsia may arise and cause further disturbance of nutrition. In either case, rickets and scurvy are dangers in the immediate future. In 95 per cent of the cases, Mann considers that the employment of whole citrated milk is immediately successful.

He advises that the milk should be scalded, i.e., that the jug containing it should be placed in water in a saucepan, the water being boiled for ten minutes; the milk should then be rapidly cooled by standing in cold water, where it should remain, covered from dirt, in the coolest part of the house.

The amount of sodium citrate which he uses is 2 gr. to the ounce of milk until the feed is a 4-oz. one. For larger feeds the same amount, i.e., 8 gr., he finds is often sufficient. If more citrate is required on account of indigestion, he uses equal parts of sodium and potassium citrate, to prevent the possibility of sodium retention. There are a certain number of children for whom 1 or 1½ gr. of sodium citrate to each ounce of milk is sufficient, but he finds that in the great majority of cases the larger amount is better.

Extra carbohydrate in the form of malt extract is given, as a rule, after the age of two months. In some cases it may be tolerated when the baby is younger, in others there is an intolerance to maltose or carbohydrate additions in any form throughout the first year; but this is quite uncommon. He never adds the malt to the regular feeds, but the total quantity ordered per diem is dissolved in a little warm milk, and given by a spoon in two or three portions between the bottle feeds. This allows of the extra carbohydrate being stopped should

occasion arise, without altering the taste or composition of the milk feeds.

He feeds even premature infants on undiluted citrated milk, and states that whether it be used as supplementary to breast-feeds or as the only form of nourishment, it will provide the most reliable way of successfully rearing such babies. He recommends that the body should be oiled and wrapped in cotton-wool. The success of such a method of feeding, especially in the case of undersized premature children, makes it impossible, he thinks, to accept the view that fat dyspepsia and intolerance is a common cause of trouble when cow's milk is employed. Even during an attack of summer diarrhoea a considerable degree of fat indigestion is possible, in his opinion, and excluding gross disorders of the gastro-intestinal tract, examples of fat dyspepsia are very uncommon. Most of such cases are due to the careless use of cream and top-milk mixtures, and to a percentage system of feeding. Although by these methods a milk of correct composition may be given, it does not follow that the baby will be able to digest the fat so well as is usually the case with fresh cow's milk, when the fat is in its natural state of emulsion and has not been separated by mechanical means. Intolerance for carbohydrates is far less common, in Mann's opinion, than is often supposed. Carbohydrates are nearly always given to excess in the form of sweetened condensed milk or as patent foods, but not infrequently far too large a quantity of cane-sugar is added to a diluted milk mixture. In these ways the fat content is low, and much of the trouble which arises is due to the fat deficiency.

Fermented Milk.—A. E. Mucklow⁴ considers that infants may be fed with precision by using milk fermented by the Bulgarian bacilli. When a culture of this organism is added to milk, and the milk is kept at a temperature of 80° to 100° for twenty-four hours, the casein is precipitated in flocculent curds, and 0.69 per cent of lactic acid is formed. This small amount can be decreased to 0.55 per cent by adding 1 gr. of bicarbonate of soda to each ounce of the fermented milk. This does not neutralize all the acidity and thereby redissolve the curds, but it diminishes it sufficiently to render the milk very palatable. The 0.69 per cent of lactic acid is formed by the splitting up of some of the lactose, and therefore the sugar content of the milk is lessened to a definite degree.

Fat Indigestion.—C. H. Dunn's⁵ idea of fat indigestion in infants is summarized in these words: "Inability to gain weight without fat, and inability to gain with it." The cases studied were those of children who showed a marked intolerance of the fat of cow's milk, manifesting itself either by failure of fat absorption, or by failure of digestion, or both. The chief sign was excess of fat in the stools.

Chronic disease, particularly tuberculosis, was found to be associated with these cases with definite frequency. Over-feeding with carbohydrate was found to have preceded the condition more often than overfeeding with fat. Long-continued over-feeding and sub-

sequent fermentation, he suggests, may be the primary defect, failure in the power to digest fats coming later and dominating the picture. He does not think that the deficient power to digest and absorb fat can be compensated for except to a very slight extent. The micro-chemical examination of the stools for fat is indispensable, in his opinion, for the proper management of these cases. The continued presence of excessive fat or soap in the stools is not incompatible with increase in weight and freedom from symptoms for a considerable time. There is always, however, a danger of a sudden failure when excess of fat is present, especially if that fat be free. Maltose is better than lactose for such cases, though whether it actually increases the power to digest or absorb fat is uncertain. The evidence with regard to the relative values of precipitated casein and unmodified protein, and the value of lactic acid milk in the feeding of these cases, was inconclusive.

In the treatment of fat dyspepsia the milk modifications must be low in fat content, average in carbohydrate, comparatively high in protein. The extra sugar should be maltose. On this treatment a certain number of the milder cases progress favourably. Severe resistant cases are those of infants who cannot gain on a low quantity of fat, and cannot tolerate an increase. Many can only be saved by human milk. Even a little breast milk may save a child who would otherwise die. After a period of breast feeding, many cases are found to be no longer so severe, and are less resistant to artificial feeding. If breast-milk cannot be obtained for the severe cases, the amount of fat given must be kept low, in spite of continued loss of weight. Excessive carbohydrate or protein or whey mixtures are not helpful and may do harm.

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1914, ii, 1799; ²*Ibid.* 1991; ³*Clin. Jour.* 1914, 689; ⁴*Med. Rec.* 1915, i, 295; ⁵*Boston Med. and Surg. Jour.* 1915, i, 167.

INFANTILE MORTALITY. *Frederick Langmead, M.D., F.R.C.P.*

According to L. Emmett Holt and Ellen C. Babbitt,¹ one-third of the deaths during the first year of life occur in the first month, and seven-eighths of these in the first two weeks. Of 100 infant deaths during the first year, approximately 33 occur during the first month, 28 during the first two weeks, 22 during the first week, and 13 during the first day. To elucidate the problem more fully, these observers have made a careful analysis of a group of cases in an obstetric hospital. Ten thousand consecutive confinements were included in their investigation, 9318 resulting in the birth of live infants. The deaths in the hospital during the first fourteen days were 3 per cent of the children born alive. For half of this number, prematurity was responsible. Congenital weakness and atelectasis together accounted for 58 per cent of the total deaths. The mortality from conditions intimately connected with delivery—accidents of labour, hæmorrhage, sepsis, and asphyxia—together were responsible for but 28 per cent

of the deaths occurring during the first fortnight of life. Malformations and congenital diseases other than syphilis caused 4 per cent, and syphilis another 4 per cent. The only important disease developing after the birth was pneumonia. Still-births were one-and-a-half times as many as the deaths from all causes during the first two weeks. Except for the large rôle played by syphilis, the causes of still-births differed in no way from those which produced death during the first days of life.

From the point of view of prevention of this loss of life, two conclusions emerged: one that the great number of deaths from congenital weakness can be reduced only by care of the mother during pregnancy, the other that the number of still-births and of deaths from causes connected with parturition can be reduced considerably by good obstetrics.

REFERENCE.—¹*Jour. Amer. Med. Assoc.* 1915, i, 287.

INFLUENZA.

Herbert French, M.D., F.R.C.P.

Sir G. H. Savage¹ states that the post-influenzal neuroses and psychoses are characterized mainly by their protean character; there is no specific form of mental disorder which deserves the name of influenzal insanity. Among the simpler neuroses he refers specially to loss of smell, which is common and slow to recover; and deafness, which may also take a long while to pass off even when there is no gross disease of the ear. He refers also to a renal psychosis, the headache and eyeache of influenza being followed by the most marked polyuria. Neuralgia may be extreme.

As regards more serious mental symptoms, he considers that these are most severe in those who have indulged in alcohol, in whom they are apt to take the form of acute delirious mania; indeed, he has found it very difficult in some cases to exclude delirium tremens. Acute delirious mania when uncomplicated, rarely has any marked rise in temperature; but in the cases associated with influenza this does not hold good. The symptoms of this disease may be briefly given. Headache, eye-ache, followed by great restlessness, in which there is very active and agitated sleeplessness. The patient soon develops hallucinations of sight and hearing; food is often refused. The almost uncontrollable restlessness leads often to difficulty in keeping the patient in bed. The tongue becomes dry, and inattention to the calls of nature may follow. The temperature may be only a few degrees above normal, but with influenzal cases he has known it rise to 105° or 106°. This state may last for some weeks; it almost always requires asylum treatment. It ends fatally in at least one-third of the cases; in one-third complete recovery will probably take place; but of the other third some become mental cripples for the rest of their lives, while some are subject to recurring attacks of mental disorder. Savage believes in **Abundant Feeding** and the use of **Alcoholic Stimulants**.

Nearly allied to the above are the cases of acute confusional mental

disorder ; there is less excitement, no rise in temperature, but a general mental confusion, often with visual or auditory hallucinations. These, like the last, have in Savage's experience occurred chiefly in young persons. The confusional cases are hopeful in prognosis, though in post-influenzal cases the progress towards health is often very slow. There is a great danger of relapse, and one has to encourage with hope for long periods. In patients who are neurotic by heredity, an attack of influenza may either accentuate a tendency or establish a morbid habit. Thus he has known young men and women who have always been looked upon as shy and introspective, or who have been highly conscientious, who, after an attack of influenza, have slowly developed paranoiac symptoms. In these cases the prognosis is not good, but when the cause has been influenza he does not give up hope for long periods. A much more grave condition is that in which young people, belonging to insane families, at or about adolescence, break down with some form of emotional mental disorder. In these, hysterical out-breaks or the development of immoral tendencies may follow an attack of influenza. Such cases not infrequently turn out to be cases of dementia præcox.

General paralysis of the insane never arises from simple influenza, but Savage has seen examples of general paralysis which have followed directly on an attack of that disease. In some cases, after the confirmation of the diagnosis the friends admit that the patient had been changing slowly for some months before the mental breakdown. In some there was the very characteristic sleepiness ; in others, change of habits in some small and immaterial way. An attack of influenza follows. This may be of only a very slight kind ; in fact, Savage has met with cases in which the patient was said to have only had a slight influenzal cold ; but whether the illness has been slight or severe, soon after it has passed, the friends notice the physical signs of general paralysis of the insane, the change of expression, the alteration in speech and gait.

Influenza during pregnancy predisposes to puerperal insanity. Post-influenzal neurasthenia is very familiar.

REFERENCE.—¹*Med. Press and Circ.* 1913, ii, 578.

INSANITY. (*See MENTAL DISEASES.*)

INSOLATION.

Cautious inhalation of **Chloroform** recommended (*p.* 12).

INTESTINAL STASIS, SURGERY OF.

E. Wyllys Andrews, M.D., F.A.C.S. (Chicago).

The *British Journal of Surgery* for April, 1915, presents a valuable series of articles by surgeons on intestinal stasis. Keith¹ describes six specimens of the large intestine removed by operation, with some observations on the motor mechanism of the colon. These were obtained from the clinics of Dawson, Lane, Moynihan, J. W. Smith, and others. These specimens were all straightened out and repre-

sented on a zero line passing through the ileocæcal junction, sections being made from each segment of the bowel from the ileum, ileocæcal orifice, appendix, cæcum, and ascending, transverse, and descending colons, for microscopical examination. In nearly all these specimens there were typical ileal bands binding down the terminal end of the ileum. The peritoneal and muscular coats were usually normal. There was an abundance of Auerbach's tissue. The fibres of the submucous coat were rather thicker and more abundant than normal. The epithelium lining the bowel and glands of Lieberkuhn was apparently normal and healthy. The sole abnormal feature, if it may be so called, was the presence in the reticular tissue of the mucous membrane of plasma cells overloaded with brown-staining pink granules. Between each pair of Lieberkuhn's glands, four to ten of these giant cells could be counted.

Mutch² discusses the bacterial activity in the alimentary tract. Apparently the ideal which our vital mechanisms strive to attain is sterility of the alimentary tract above the ileocæcal valve, with very free bacterial growth below that barrier. Elaborate experiments are recorded, showing the different degrees of decomposition at various levels, as duodenum, stomach, ileum, and so forth. These were also investigated by Röntgenography, and by chemical examination of intestinal contents. Chronic infection through the walls of the intestinal tube is responsible for cases of leucopenia, mild anæmia, and relative lymphocytosis, which Robertson finds to be a constant feature of chronic intestinal stasis, indicating the working of bacterial toxins which have gained entrance through the intestinal mucosa. These patients also show great muscular weakness and liability to fatigue. For **X-Ray** diagnosis in connection with this condition, see page 50. The association between these phenomena and chronic arthritic changes is illustrated in *Plate XXV*.

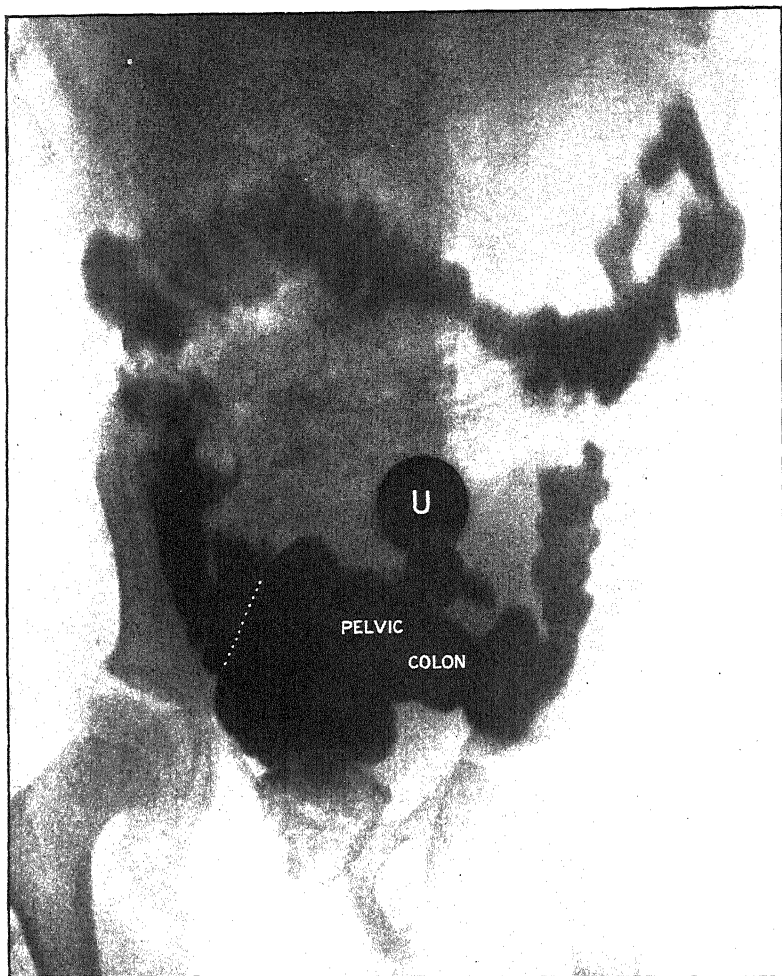
Barling,³ of Birmingham, reports his personal experience with ileosigmoidostomy for the relief of constipation and intestinal stasis. In the four cases reported, the transverse colon was found to be much lower than normal. Great improvement followed the operation, and sometimes an unpleasant diarrhœa, but there was no retrograde distention of the colon.

Barrington-Ward⁴ contributes a paper on colectomy for Hirschsprung's disease. He doubts if this can ever be cured except by operation. Diagnosis with the aid of bismuth meal and radiograms is now a simple matter. Surgical treatment has seen a variety of methods which were inefficient. To Lane's enterprise we are indebted for a technique that brings about a radical cure by removal of the whole colon. Of 7 cases reported by this writer, 2 have died, one from shock and the other from accidental hæmorrhage. The remainder are markedly benefited.

Fagge and Hughes⁵ contribute to this symposium an analysis of a consecutive series of cases of various forms of arthritis treated by ileocolostomy or colectomy. These include tuberculous joints to

PLATE XXV.

• INTESTINAL STASIS—A CASE OF STILL'S DISEASE



The colon twenty-four hours after a bismuth meal. When seen at the thirtieth hour, bismuth was still present in all parts of the large intestine. Note the great enlargement of the pelvic colon. (This was also the most marked deformity of the alimentary tract seen at the operation on another boy, also suffering from Still's disease.) The patient has suffered from increasing pain, stiffness, and swelling in hands, knees, and spine for fourteen months.

Kindly lent by 'The British Journal of Surgery.'

the number of 23; also 3 cases of Still's disease, and 10 cases of rheumatoid arthritis. Uniform improvement, fairly attributable to the operation, has followed in the cases of arthritis.

A short series of operations for intestinal stasis was contributed by Mothersole,⁶ of Bolton. There were 14 cases in all, the last 10 being treated by hemicolectomy, with uniformly good results. None of them had trouble either at the anastomosis or in the abdominal wall. In 2 of the cases the results were disappointing. The remainder derived much benefit from the operation.

Smith and Keilty,⁷ of Philadelphia, report 100 autopsies on cases of intestinal stasis, bands, kinks, and membranes. The purpose of the paper is to correlate the various phases for the benefit of the general practitioner. After a discussion of the embryology and the physiology of the intestinal tract, the writers report from their autopsy studies the apparent classification of peritoneal bands into three types: First, peritoneal anomalies; second, developed folds, hypertrophies of "crystallization of the lines of strain"; third, peritonitis, subdivided into acute fibrinous and chronic fibrinous.

This classification is made mainly on gross appearances. Peritoneal anomalies appear as normal folds of peritoneum, mesenteries, or omentums. They are usually thin, and have a normal blood-vessel distribution. The writers suggest the following conclusions regarding these cases. Intestinal toxæmia is common, the result of stasis, brought about primarily by the traction of these various bands, producing intestinal hypertrophy, with secondary fatigue or degeneration and dilatation. The condition occurs in the well-nourished as well as in the neurasthenic. Intestinal ptosis occurring with general visceroptosis is merely an exaggerated type of the simpler forms. The various possibilities must be clearly understood, and each individual case carefully studied, before any treatment is inaugurated. When surgical means are applied, the mechanism must be clear, else the result will be worse than the original condition. Finally, at operation the entire abdomen must be carefully explored, because these conditions rarely affect one region without another.

REFERENCES.—¹*Brit. Jour. Surg.* 1915, Apr. 576; ²*Ibid.* 608; ³*Ibid.* 653; ⁴*Ibid.* 655; ⁵*Ibid.* 657; ⁶*Ibid.* 664; ⁷*N. Y. Med. Jour.* 1915, i, 549.

INTESTINAL SURGERY. (See also ABDOMEN, PENETRATING WOUNDS OF; INTESTINAL STASIS.)

E. Wyllys Andrews, M.D., F.A.C.S. (Chicago).

Cantlie¹ discusses the behaviour of the *sigmoid flexure* in health and disease. Just as the anatomists were abolishing the very name of this region, its clinical significance in modern medicine attained new importance. Cantlie proposes to abolish the word 'flexure,' viewing the sigmoid as an organ of definite function, having rather the nature of an organ than of a mere channel. At the end of the sigmoid the bowel has a narrower lumen, and the mucosa is not so loose as at other parts. He therefore divides this part of the colon

into the colosigmoid and sigmorectal, giving them the same importance as the pylorus. The function of the sigmorectal constriction is seen with the sigmoidoscope. The patient complains but little until the tube reaches this junction of the rectum and sigmoid. Here it meets a sort of sphincter, which the writer calls the sigmorectal pylorus. To examine the sigmoid with the sigmoidoscope, a cannula 8 inches long is needed. This aids in the diagnosis by allowing careful examination of the sigmoid diseases, and topical applications, and by relieving the constriction nearly always present. Lesions in the sigmoid are most characteristically seen at just this level. When inflamed and ulcerated, local treatment can here be applied so as to reach accurately the diseased area. *Plate XXVI* shows accurately the boundaries of the region under discussion.

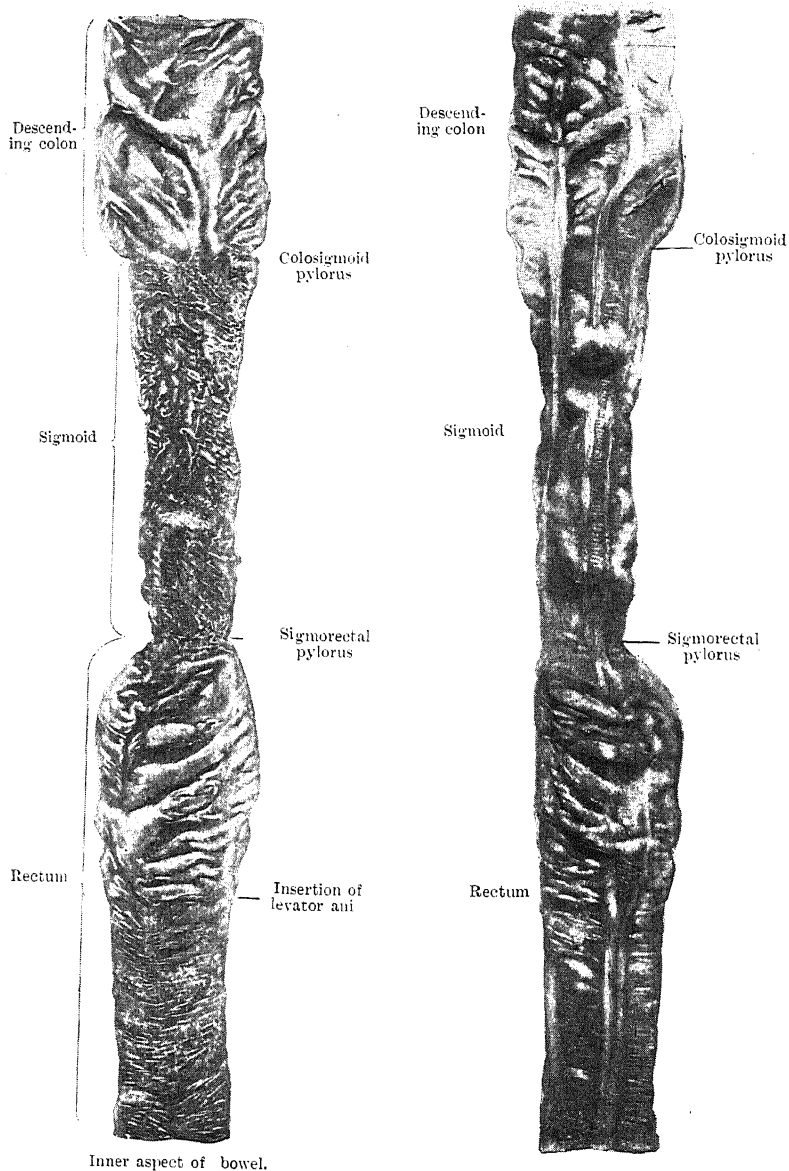
Oppel² reports a large series of operations upon the large intestines for various conditions, such as megacolon, colitis, volvulus, carcinoma, and so forth. His conclusion is that methods of anastomosis and resection of the large intestine have still to be investigated and improved. The literature dealing with these problems is extensive, but contradictory. In particular, short-circuiting operations have resulted in many disappointments, and this is also true of partial resection for intestinal stasis or for malignant disease. Numerous diagrams are given showing the drawbacks and defects of intestinal exclusion operations, such as ileosigmoidostomy, with or without the division of the proximal portion of the ileum. When a portion of the colon is left open at the lower end, intestinal stasis may be followed by impaction, almost of itself requiring a new operation. It seems, therefore, until our methods are somewhat more perfect, we must consider these short-circuiting operations as only on trial. Various modified methods, such as transversal sigmoidostomy, which was performed six times by the writer, also gave a large proportion of disappointing results. The paper also covers the problem of artificial anus by right-sided and left-sided colostomy. Here, also, no positive conclusions are to be derived from the author's report.

Deaver³ publishes statistics of 276 cases of *intestinal obstruction*. Of these, 158 recovered and 118 died—42 per cent. The high mortality is attributed by him to the late stage in which many patients came to operation. Of these cases, about 90 per cent were due to hernias and post-operative adhesions. Among them were 156 cases of strangulated hernias, namely, inguinal, 77; femoral, 50; umbilical, 21; ventral, 7; subdiaphragmatic, 1. Of these, 74 per cent of inguinal and 72 per cent of femoral recovered. The appalling mortality in strangulated hernias is also explained by the delay before operation, and too long efforts at taxis. Next to hernia, post-operative adhesions gave 81 cases, or 29 per cent of the total. Here the mortality was 49.3 per cent. A small percentage occurred during convalescence from operations. The longest period intervening was twenty years following a hysterectomy. Of these 81 cases, 51 followed operation for appendicitis, and 44 of these had had drainage.

PLATE XXVI.

BOUNDARIES OF THE SIGMOID

(CANTLIE)



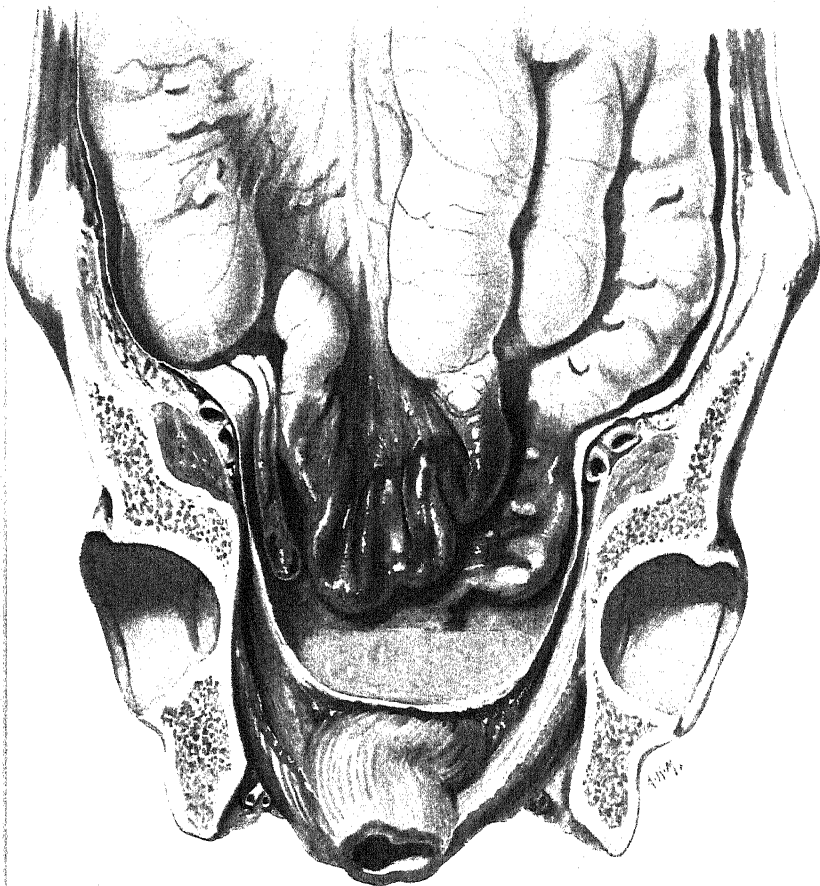
Inner aspect of bowel.

Kindly lent by the 'Journal of Tropical Medicine'

PLATE XXVII.

ILEUS DUPLEX ARISING FROM GANGRENOUS PELVIC APPENDICITIS

(SAMPSON HANDLEY)



The pelvis is occupied by a pool of pus bathing the inflamed pelvic ileum and pelvic colon. The last two inches of the ileum are normal. The suprapelvic ileum is much distended, but is neither paralyzed nor inflamed. A fairly sharp line separates it from the inflamed portion of the ileum. There is no peritonitis above the pelvic brim.

From 'The British Journal of Surgery.'

Adynamic ileus accounted for 2 cases, with 1 recovery and 1 death. There were 3 cases of tubal infection, with 2 deaths. Of 5 cases of volvulus, 3 recovered.

Handley⁴ describes *ileus duplex*, or inflammatory enterocolic ileus, in the Hunterian Lecture. The best classification of ileus he considers to be that of Murphy into (1) Muscular paralysis; (2) Local peritonitis; (3) Local or general septic peritonitis; (4) Embolism of the mesenteric vessels; (5) Pylephlebitis; (6) Strangulation of pedicle, with reflex paralysis. Ileus duplex may result from any one of these

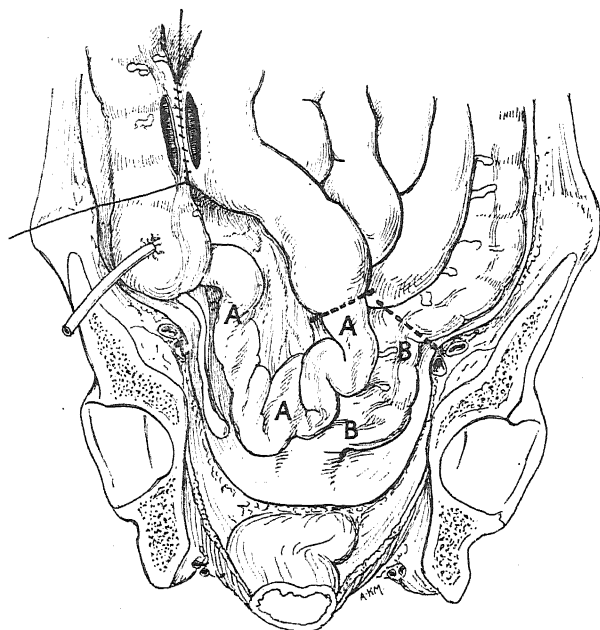


Fig. 39.—Diagram illustrating the pathology and treatment of ileus duplex. AAA, The paralyzed segment of ileum. BB, The paralyzed segment of the pelvic colon. The dotted lines indicate the level of the obstruction in the small and large intestine. A lateral ileocæcostomy is being performed between the distended ileum well above the obstruction and the cæcum. To relieve the temporary obstruction of the large intestine a catheter has been tied into the cæcum. The catheter is subsequently brought out through the abdominal wall.

causes, as in appendicitis, ascending infections of the genital tract, rupture of the bladder, carcinoma of the rectum, and so forth. Appendicitis is the most frequent cause. The morbid anatomy shows during life an inflamed and adherent small intestine, namely, the lower two or three feet of the ileum, immersed in pelvic adhesions due to infection from whatever cause. While these may exist with a general peritonitis, in this type of case the bowel above is shut off by a lymph barrier, so that only the ileocæcal region is involved. (See Plate XXVII, kindly lent by the *British Journal of Surgery*.)

The clinical symptoms of such a condition are those of obstruction, added to those of pelvic inflammation, general tenderness, and distention, with rigidity and local soreness and pain. *Fig. 39* shows the author's method of dealing with the impaired function of the lower ileum by creating a communication with the healthy bowel above by lateral anastomosis.

Waring⁵ opened a discussion upon malignant diseases of the cæcum. These are, in his opinion, usually columnar-celled carcinoma, forming a mass protruding into the lumen of the bowel, less commonly an annular ring of new growth. These cancers are not, on the whole, as malignant as those of other parts of the body, lymph-gland infection taking place somewhat later, as well as other metastases. As to frequency, he found that 17 cases out of 107 malignant tumours of the intestine in St. Bartholomew's, 1909-13, were carcinomata of the cæcum. Occasionally, tumours removed from this region were found microscopically to be some other growth, such as actinomycosis, or tuberculosis of the ileocæcal region.

Bland-Sutton⁶ describes the various forms of cancer of the duodenum and small intestine. In the duodenum, since ulcer is a common affection, we find indurated scars in the first 2 cm., from old ulcers. Many surgeons class this as a precancerous condition, yet in this portion of the duodenum carcinoma is very rare, only one case having been seen by the writer. Circum-ampullary cancer, or that springing from the region of the gall-ducts, often escapes detection, and is very difficult to differentiate from primary tumours of the gall-bladder. In that part of the duodenum below the ampulla, carcinoma is relatively common, the symptoms being like those of carcinoma of the pylorus, but the vomited matter contains bile and pancreatic fluid. Cancer of the jejunum and ileum are interesting clinically. Small-intestine tumours are rare; those of the benign group are usually pedunculated. Cancer at the end of the ileum, near the ileocæcal valve, is seldom seen, but at the valve four kinds have been observed by the writer: (1) Arising in the ileum; (2) Arising in the cæcum; (3) Arising in the vermiform appendix; (4) All of these may be simulated by hyperplastic tumours of the ileocæcal region. Primary malignant disease of the appendix has been observed several times. In one of the writer's cases, age 73, there was a movable, easily detected mass in the abdomen, which operation showed to be in the vermiform appendix. Melanosis of the colon has received little attention, according to the writer, since it is rare in England. The mucous membrane in a growth of this sort is inky black, but the growth otherwise has the microscopic appearance of primary carcinoma.

REFERENCES.—¹*Jour. Trop. Med. and Hyg.* 1915, 1; ²*Ann. Surg.* 1914, ii, 409; ³*Ibid.* 1915, i, 198; ⁴*Brit. Jour. Surg.* 1915, No. 10, 161; ⁵*Lancet*, 1914, ii, 1692; ⁶*Ibid.* 931.

JAUNDICE, CONGENITAL ACHOLURIC. (See SPLENIC ANÆMIA.)

PLATE XXVIII.

KNUCKLE PERCUSSION TEST IN DIAGNOSING CARPAL INJURIES



Fig. A.—Percussion of middle knuckle in ulnar flexion: (i) Most painful with scaphoid fracture; (ii) Less painful with scaphoid fracture; (iii) Still less painful with semilunar dislocation. (Percussion over the ring finger with ulnar flexion of the hand is not painful at all in scaphoid fracture, but very painful in fracture of the semilunar.)



Fig. B.—Percussion of middle knuckle in radial flexion: (i) Most painful in scaphoid fracture (but percussion over the knuckle of the index finger is still more painful, and over the ring-finger knuckle not painful at all). (ii) Very painful with semilunar fracture; (iii) No pain to speak of with semilunar dislocation.

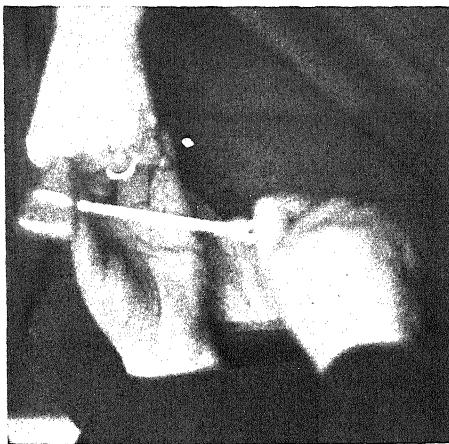


Fig. C.—Showing how *not* to perform knuckle percussion. Unless the surgeon has firm control over the patient's hand and wrist, the latter is likely to wince before the knuckle is struck, and so destroy the accuracy of the test. It is also well for the patient to close his eyes before the test is made.

The surgeon stands in front of the patient, grasping the latter's left wrist with his left (or vice versa), holding it tightly against his body

JOINTS, INJURIES TO.*W. I. de C. Wheeler, F.R.C.S.I.*

Unlike the peritoneum, the synovial membrane has little defensive properties against the invasion of micro-organisms. The lining mesothelial cells are first destroyed, and the bacteria enter the sub-mesothelial lymph-channels and cause disintegration of the entire joint structure. Early conservative treatment in compound injuries is sufficient to protect the mesothelial cells, and if this is accomplished the result is excellent. Even though infection is present the most stringent aseptic methods are required. There should be no handling of the wound, no wiping with gauze, and instruments should be sparingly employed, lest the delicate synovial lining be traumatized and the smooth surface destroyed, a condition precedent to ankylosis. The wound in the capsule and synovial membrane is closed with fine catgut *without drainage*. A small drain in the superficial wound is often an advantage. The joint is then injected immediately with 2 per cent solution of **Formalin** and **Glycerin**, and a heavy weight extension applied. The injection may be repeated in twenty-four hours (see JOINTS, SURGICAL DISEASES OF). Drainage, except in cases of urgency, is contra-indicated, and usually results in fibrous ankylosis.

Murphy¹ discusses injuries of the carpus. (*Plate XXVIII.*) Fracture of the scaphoid occurs in 1 to 2 per cent of all wrist fractures. When the hand is in radial flexion the scaphoid lies between the os magnum and the radius. Force transmitted from the palm drives the os magnum like a wedge into the concave surface of the scaphoid, and the latter breaks transversely. In ulnar flexion the scaphoid lies further outward between the styloid process of the radius and the trapezium and trapezoid. In this position the long axis of the scaphoid is presented to the force, and a fracture is less likely to occur; sometimes, however, an impacted fracture occurs, or the tuberosity is torn off. Semilunar dislocation is the second most frequent injury of the carpus. Displacements of the semilunar and fractured scaphoid may be corrected when recent by manipulation or open operation; in late cases, or where reduction is impossible, satisfactory results are obtained by the removal of one or both bones.

Runyan² reports eight cases of dislocation of the semilunar bone, and summarizes his experience as follows: Careful examination of all carpal injuries, and multiple x-ray plates, are necessary for diagnosis. Closed reduction can be accomplished in about one-half of the recent cases by the method of hyperextension followed by flexion, while counter-pressure is maintained over the dislocated semilunar. Prompt diagnosis and treatment are essential in obtaining good results. The more speedily the dislocation is recognized and reduced, the better the result. Closed reduction should always be tried, irrespective of the length of time the dislocation has existed. If this is impossible, an anterior incision should be made and the dislocation reduced. Failing in this, it is necessary to excise the semilunar, but excision should be done only as a last resort.

Telford³ lucidly explains one of the causes of difficulty in the reduction of some dislocations of the shoulder-joint. It is more likely that the great tuberosity of the humerus, carrying the attachment of the supraspinatus, infraspinatus, and teres minor muscles, is torn off, than that the muscles themselves are injured. This is frequently unrecognized, and often cannot be ascertained without *x-ray* photographs. The posterior external lip of the bicipital groove is formed by the greater tuberosity; if this is detached, the sheath of the tendon is torn and the tendon displaced backwards to the outer side of the humeral head.

It is in those cases in which the whole tuberosity is detached that reduction of the dislocation is likely to be difficult or impossible by ordinary means. In any case of dislocation of the shoulder which resists the classical means of reduction, properly carried out under general anæsthesia, some displacement of the greater tuberosity should be suspected. The difficulty in reduction is due to the detachment of the tuberosity setting free the long tendon of the biceps, which, falling at once into the gap between the tuberosity and the head of the bone, lies firmly hitched against the rough fractured surface of the humeral head. In this way it opposes a serious, and it may be an insuperable, obstacle to its reduction. If the head of the bone is lying far forwards, the tendon will be found not merely against its outer side, but actually wrapped round the head from behind forwards. In such cases no measures designed to secure relaxation of the biceps during manipulation of the humerus will avail to release its imprisoned head. This displacement of the long tendon of the biceps may be a source of serious error, since the surgeon may, on manipulation, obtain a deceptive sense of reduction of the dislocation; such reduction is, however, incomplete, and is certain to be followed by a relapse. Where the ordinary means of reduction fail and the presence of a separated tuberosity is disclosed by a radiogram, it is essential that the region be exposed freely and the reduction carried out under direct inspection of the injured parts. (*See also p. 54.*)

The technique of the operation is as follows: The shoulder-joint is approached by the usual anterior incision; the body of the deltoid is identified and retracted. The long tendon of the biceps is at once seen, and if, with the arm placed in a position to relax this muscle, the tendon be disentangled and levered over the head of the humerus, the bone slips at once into its socket. In Telford's second case he found it of advantage to place the skin incision in a plane more external than the classical anterior route. The incision, if made parallel and 1 in. external to the anterior border of the deltoid, will, after splitting the muscle fibres, give direct access to the fracture without prejudice to the reduction of the dislocation. The fragment of the tuberosity is secured, and, aided by external rotation of the arm, it is, in any recent case, easily placed in the bed from which it has been torn. The tuberosity should be fixed in place by drilling its compact tissue close to the edge and securing it by small loops of wire which pass through

corresponding holes drilled through the compact tissue of the humerus close to the line of fracture. The use of a screw or peg might appear to be the simpler method, but if this be attempted it will be found that the loose cancellous tissue of the head does not give a satisfactory hold.

Risley⁴ has given attention to 450 cases of common shoulder injuries, and lays special stress on so-called trivial injuries to the bones of the shoulder-joint. Amongst these he includes injuries to the acromion and the greater tuberosity of the humerus, and lesions of the acromioclavicular articulation. Nerve lesions were found to be rare in this series, and occurred more frequently in connection with dislocation than with fracture. Extra-articular lesions merit more attention than they have previously received. He classifies them as follows: (1) Simple contusion or sprain of shoulder without fracture or other complication; (2) Subacromial bursitis: (a) Occupational, (b) traumatic, (c) secondary to some other injury or infection; (3) Fracture, insertion fracture, or contusion of the greater tuberosity of the humerus or acromion; (4) Dislocation of the joint; (5) Ruptured supraspinatus tendon, with or without separation of the greater tuberosity; (6) Fracture of the upper end of the humerus; (7) Chronic arthritis of the acromioclavicular joint; (8) Occupational neuroses or pain (so-called); (9) Arthritis of the shoulder-joint: (a) traumatic in origin, (b) old infectious joints; (10) Injuries to the brachial plexus.

The most common injury is simple contusion from falls or other external violence. This may or may not be accompanied by bone bruise i.e., periostitis. This type of case generally recovers with rest of the part, liniments, and massage, in from one to four weeks, provided there is no bone injury.

There is one type of injury which is particularly painful, troublesome to treat, and recovers slowly. This is the severe bruising of the greater tuberosity of the humerus, but without fracture. This injury should not be confused with the so-called sprain-fracture of Ross and Stewart (to be spoken of later), as there is no separation of bony fragments, but only severe contusion of bone, probably setting up a localized periostitis. The x ray generally shows slight roughening of the tuberosity. This injury results in very stiff and painful shoulders for one to three months, and is little affected by external applications or aspirin. They are stubborn to treat, probably because they often develop a bursitis in about one to two weeks after injury, and this adds to the discomfort and limitation of motion. This injury has its counterpart in a similar bruising of the tip of the acromion, which gives practically the same chain of symptoms, but is less often followed by bursitis, and is nearly as painful and resistant to treatment as injury to the tuberosity. The treatment consists of rest to the part, strapping, gentle massage, with hot air and very gentle passive motion.

Fracture of the acromion was found to be quite common. Three grades of severity exist: (1) Well-marked fracture with separation;

(2) Separation at the epiphysial line ; (3) Sprain-fracture, which is by far the most common.

By 'sprain-fracture' is meant the tearing of the insertion of a muscle or ligament, often from the acromion or great tuberosity. It is not quite settled in these cases whether a small portion of periostium is at first lifted off and afterwards proliferates, giving rise to the dense shadow in an x-ray photograph, or actual bone is detached as the result of the injury. Risley prefers the term 'insertion-fracture' to 'sprain-fracture.' Sprain-fracture was first described by Callender in 1870 as a lesion in which some ligament or tendon is torn, carrying with it a flake or shell of bone into which its fibres are inserted. This injury, as would be supposed, is practically always caused by indirect violence, and is evidenced clinically by sharply localized tenderness and a small localized area of swelling over the immediate site of the lesion, and disability only such as would be caused by the pain attendant on motion.

Treatment should be by absolute rest of the part and practically absolute fixation for one to two weeks, followed by gentle passive motion and massage for one to two weeks longer ; three to four weeks should suffice to make the arm useful again. Definite well-marked fractures of the acromion are rarer than the other two types, and are more often accompanied by injuries to the outer end of the clavicle or luxation of the acromioclavicular or coraco-acromial joints.

Subacromial or subdeltoid bursitis, according to the author, never occurs from injury to the bursa alone ; some concomitant injury is always present, such as fracture, insertion-fracture, periostitis, or simple contusion of the greater tuberosity or acromion process. Apart from trauma, which does not produce a lesion of the bursa *per se*, nearly 60 per cent of subacromial bursitides are of the occupational type. They occur in tailors, cigar makers, telephone operators, cobblers, etc., in other words, those whose occupations require certain fixed and limited motions with one or both arms.

Three forms of treatment will cure the three grades of severity : (1) Rest from one to three weeks will cure the mild cases, but there is always danger of recurrence on resumption of the former occupation ; (2) Change of occupation when this is possible, in more persistent cases not cured by rest ; and (3) In stubborn cases, and in those who are unable to change their occupation, excision of the inflammatory tuft is the only means of giving sure relief. This can be done easily and quickly under novocain anæsthesia. The bursa is easily exposed through the separated deltoid fibres, opened ; the inflammatory tuft—which is practically always demonstrable to those looking on even at a distance, or adhesions, which are very common—excised, and the wound closed.

Rupture of the supraspinatus tendon was diagnosed in thirty-two cases. It seems fair to set a time limit of at least three months after injury before an absolute diagnosis can be made, the reason being that so many other injuries, such as severe strains or contusions to

surrounding parts, give symptoms during that time and before their subsidence, identical with those of ruptured tendon. This is why Codman says he never operates on an acute case. Adhesions in the subacromial bursa are often diagnosed as rupture of the supraspinatus tendon. These cases are operative, however, and therefore a mistake in diagnosis does the patient no harm. The rule may be laid down that all fresh cases diagnosed as ruptured supraspinatus, and not improving under routine treatment after three months, should be subjected to an exploration of the bursa and tendon.

The cardinal signs and symptoms of rupture of the tendon of the supraspinatus are as follows: (1) History of trauma, generally a fall with attempt to save oneself, thus causing severe strain of the shoulder; (2) Inability to abduct arm from side actively; (3) Inability to hold arm at horizontal against pressure after it has been placed there by the examiner; (4) Pain, especially at the deltoid insertion, and over the site of the tear in the tendon, on attempts at abduction; (5) External and internal rotation practically normal. These are the typical signs of rupture of the supraspinatus tendon. Simple adhesions in the bursa may cause the same chain, but are liable to be accompanied by more pain on motion and some restriction of the rotary movements.

For recurrent dislocation of the shoulder, Thomas's anterior capsulorhaphy is the operation which should, in Risley's opinion, give good results.

Capsulotomy of the Elbow-joint.—Following injuries to the elbow-joint or to the bones immediately above or below, limitation of the

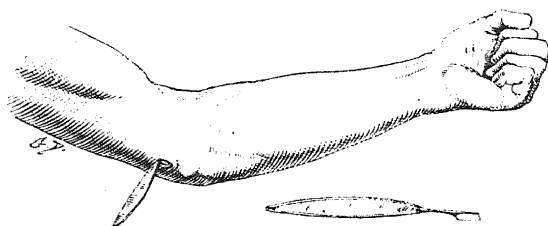


Fig. 40.—Capsulotomy to correct the semiflexed position after injuries to the elbow-joint. A tenotome (Jones's) is passed across the bone above the internal condyle, and the capsule divided (Wheeler).

power of extension constantly persists. This is due to shortening of the strong anterior portion of the capsule, and can be relieved by the little known, but simple, operation of capsulotomy. A small incision is made down to the supracondylar ridge on either side of the lower end of the humerus. A tenotome is passed through the opening across the front of the bone just above the joint, and with a few strokes divides the capsule (Fig. 40). The semiflexed arm, which resisted all efforts at forcible extension, now literally falls into the straight position, and no further trouble is encountered. Lengthening

of the biceps tendon has been tried, but for obvious reasons is a useless operation. Capsulotomy of the hip-joint to relieve flexion in old-standing arthritic cases is a successful adjunct to other operative procedures, and in flexion contractures of the wrist. Capsulotomy may be required in addition to tenoplasty.

REFERENCES.—¹*Murphy Clinics*, 1915, 383; ²*Surg. Gyn. and Obst.* 1915, June, 60; ³*Med. Chron.* 1915, Jan. 218; ⁴*Boston Med. and Surg. Jour.* 1915, ii, 418.

JOINTS, SURGICAL DISEASES OF. *W. I. de C. Wheeler, F.R.C.S.I.*

Robert Jones¹ calls attention to the surgical treatment of arthritic deformities. By anticipating the deformities likely to occur at the various joints in the natural course of disease, the most satisfactory results can be obtained in early cases. In arthritis of the big toe we must expect plantar flexion; of the ankle, extension; of the knee, flexion, accompanied in the more pronounced cases by rotation outwards and displacement backwards of the tibia; in the later stages of arthritis of the hip, flexion, adduction, and internal rotation; in that of the wrist, palmar flexion; in the elbow, extension to about 110°, and in arthritis of the shoulder, adduction. In cervical caries the malposition of the head depends upon the location of the disease. If the upper two or three vertebræ are diseased, the head is twisted to one side into the position of wry-neck. If the disease be lower, the chin is advanced and dropped towards the chest. If the disease is yet lower, the chin is elevated and somewhat advanced, the head being thrown backwards towards the shoulders, which are raised to meet it.

In view of the possibility of ankylosis, the surgeon should ascertain from the patient what position he would desire his joint, in order to obtain most use from it. In the case of the elbow this will depend largely upon occupation, and to a lesser extent also in the case of the hip. The hip is usually best fixed fully extended, as is also the knee; if bony ankylosis should occur, a little flexion at both joints is no disadvantage. The ankle should be fixed at right angles, and the elbow slightly below the right angle. The wrist should be kept hyperextended.

In tuberculous cases the activity of the disease is no contra-indication to the correction of the existing deformity, and a general dissemination of tubercle need not be feared. In the case of the hip, flexion and adduction are corrected without the use of excessive force, and the position is maintained by the use of a light iron abduction frame, which also provides for the necessary extension and counter-extension. Flexion of the knee and rotation outwards of the tibia is corrected, and extension applied by means of a Thomas knee bed-splint.

The use of the abduction frame and the Thomas knee bed-splint as recommended by Jones is advisable; the former is not only of use in the treatment of arthritic deformities of the hip, but is an ideal apparatus for the management of fractures of the neck of the femur. Extension and abduction are provided for in the simplest manner. In

addition to the maintenance of a correct position in arthritic deformities of the knee, all fractures (especially if compound) of the femur below the trochanters and of the leg above the ankle-joint can be adequately treated by the proper application of a Thomas knee bed-splint.

In the same paper Robert Jones refers to the surgical treatment of arthritic joints of the septic and rheumatoid variety, and quotes the results obtained by Sampson Handley and W. I. Wheeler after the operation of 'cheilotomy.' In this operation, in the case of the hip, the 'lipping' of the margin of the acetabulum and the new bone surrounding the neck of the femur are removed by the chisel and gouge.

In one case,² a girl, age 21, had crippling rheumatic arthritis of the hip-joint with intense pain for seven years. She could walk with crutches with the utmost difficulty, as the knee on the other side was also diseased. The operation of cheilotomy was performed on both joints; the result was excellent. The patient was well two years after operation, with no return of pain, and had walked unaided without pain since the time of operation.

J. B. Murphy³ discusses ankylosis of the hip due to 'lipping.' He recommends his operation of arthroplasty in addition to cheilotomy to prevent recurrence.

Murphy considers all non-traumatic inflammations of joints to be of metastatic origin, the source of infection being often the nose and throat, or vaginal or other discharge. Typical metastatic infection into a joint also follows furuncles, carbuncles, and pustules of the skin. The joint in the absence of treatment is always destroyed when the infection is initiated by a chill. The factors determining destruction are: (1) Virulence of the micro-organisms producing the infection; (2) The lowered resistance of the patient; (3) Retention of infection products—pus under pressure; (4) Intra-articular pressure of inflamed joint surfaces by muscular contraction. It is pointed out that just as gonococcal arthritis appears in from eighteen to twenty-two days after the primary urethral infection, so influenzal infection of joints occurs between the tenth and fourteenth days after the manifestation of the primary focus. Staphylococci and pneumococci metastasize into joints make their appearance on the ninth to the sixteenth day. Infections of streptococci origin affect the joints (e.g., scarlatinal arthritis) about the fourth or sixth day after the primary onset of the disease. In typhoid fever metastases appear late in the joints and bones, coming on about the fourth to the eighth week, or about the time the ulcers are healing or healed.

Murphy thinks that the term 'rheumatism' should be expunged from medical nomenclature, and the term 'metastatic arthritis' substituted when disease involves the joints. The polyarticular variety of joint effusions is rarely initiated by a chill, and seldom leads to bony ankylosis. It is the result of the milder forms of microbic infection. It may, however, occasionally assume a virulent type. The

treatment of a severe metastatic arthritis should be commenced without delay. From 10 to 20 c.c. of 2 per cent **Formaldehyde** and **Glycerin** solution are injected into the joint after aspiration. The tension is thus relieved, and in addition to a direct partial sterilization of the joint the solution produces a marked leucocytosis. The injections are repeated every three or four days if necessary. A heavy Buck's extension should be applied to relieve the intra-articular pressure produced by muscular spasm. The same treatment is recommended in traumatic cases after the joint cavity has been closed by suture. In no case should drainage be employed if it can possibly be avoided.

In late cases, where ankylosis has occurred, arthroplasty is the operation of choice, and, according to Murphy, gives excellent results. The ankylosed joint is divided with an artist's chisel, the joint surfaces are remodelled, and a pedicled fat and fascia flap from the immediate neighbourhood is introduced to prevent re-union of the bony surfaces.

Zapffe⁴ summarizes the pathology and treatment of acute infectious (metastatic) arthritis. He states that it is a clinical observation that ankylosis usually follows a metastatic arthritis initiated by a chill, and the rigor should be taken as a warning of the final result. This point requires emphasis. It indicates that the form of infection is severe or that the resisting powers of the patient are low. When many joints are involved, the infection is not, as a rule, preceded by a chill, and ankylosis does not follow; but some few cases arise where a polyarticular arthritis assumes a severe form, is preceded by a chill, and ends in multiple ankyloses.

The treatment consists of the following steps: (1) The relief of intra-articular tension by aspiration. A large needle should be employed, fitted to a heavy screw syringe. Tension can be readily relieved by incision and drainage, but this procedure will be followed in 96 per cent of cases by ankylosis, and is therefore contra-indicated. (2) Relief of intra-articular pressure due to muscular spasm round the joint. This is brought about by weight extension; usually fifteen to twenty pounds is required, but sometimes much more. The extension is applied immediately the case is diagnosed, and not removed until all signs of inflammation have disappeared. In applying Buck's extension below the knee, care should be taken to place the adhesive strapping below the head of the fibula, so as to avoid the external popliteal nerve. Paralysis of the nerve and drop-foot have been noted to follow carelessness in this respect. (3) Neutralization of the infection in the joint and the production of a local immunity. This is accomplished by the injection of a 2 per cent solution of **Formaldehyde in Glycerin** through the needle after aspiration. The mixture must be allowed to stand at least twenty-four hours before use, and then be repeatedly shaken. The amount used for the joints varies; e.g., 15 to 20 c.c. are required for the knee-joint; 5 to 7 c.c. for the wrist, elbow, and shoulder. The injections are repeated in virulent cases every twenty-four hours; in mild cases one or two injections in a week are sufficient, and the cure is often not delayed beyond this period.

Devine recommends the free transplantation of masses of fat and fascia for the cure of ankylosis between the raw bone surfaces forming a joint, and states that the lymph which nourishes these tissues is sufficient to maintain vitality, because when *in situ* they thrive on a very poor blood-supply. In performing arthroplasty of the shoulder-joint, after separation of the ankylosed surfaces the head of the humerus is shaped with a reamer, and a large fat and fascia flap removed from the thigh and sutured round the head and neck of the humerus.

Henderson,⁵ in a paper on resection of the knee for tuberculosis, points out that a functioning knee rarely follows conservative treatment in an adult. Tuberculosis rarely brings about ankylosis, thus widely differing from the acute metastatic infections of joints. In tuberculosis of the knee in adults, although conservative methods may be tried, resection is usually the final solution. If the patient's business requires much standing, about 10° flexion is desirable; but for those whose occupation requires them to be seated, the bony surfaces are removed, so that ankylosis will be obtained with 15° to 20° flexion. Amongst other practical points in this paper, Henderson refers to the fact, now well established, that it is neither necessary nor desirable to remove the involved soft tissues by extensive dissection; once fixation of the joint is established by bony ankylosis, any remaining involvement of the tissues becomes spontaneously cured.

REFERENCES.—¹*Brit. Med. Jour.* 1914, Oct. 31; ²*Ibid.* 1913, May 10; ³*Murphy Clinics*, 1914, 29; ⁴*Surg. Gyn. and Obst.* 1915, i, 198; ⁵*Jour. Amer. Med. Assoc.* 1915, i, 140.

KALA-AZAR. (See LEISHMANIASIS.)

KERATOSES, SEBORRHÆIC. *E. Graham Little, M.D., F.R.C.P.*

Sutton¹ gives this name to the affection more often described as senile keratoma, or 'seaman's skin,' after Unna, and contributes a valuable paper based on a histological examination of thirty-one cases. His nomenclature is perhaps unfortunate, for it is better to restrict the term seborrhæic to the affections which can be shown to depend on the presence of the *Bacillus seborrhææ*. He uses the term to include conditions in which oiliness of the skin is increased. Clinically, seborrhæic keratoses begin as small, round or oval, brownish macules. The sites of predilection are the face, scalp, trunk, particularly the interscapular and sternal regions, and the backs of the hands. When fully developed, the growths are flat-topped, papular elevations, usually oval in outline, yellowish, greyish, or brownish in colour, sharply circumscribed, and covered with a firmly adherent crust which is usually greasy and velvety if the lesions are situated on the trunk or scalp, and harsh, rough, and dry if they are located on the face or hands. When the crust is carefully removed, its under surface often presents numerous tiny projections which formerly extended into the mouths of the follicles. Not infrequently the location of an involved area is apparently dependent on some preceding slight injury of the skin, such as a nick from a razor while shaving.

The tumours never disappear spontaneously, and they may persist indefinitely without change; but generally, and especially in those instances in which the growths are exposed to constant or repeated irritation of any sort, the bases of some of them undergo further pathological change and ultimately become malignant, the resulting carcinomas invariably being of the prickle-cell type.

As a result of his personal study of cases, he divides these into three groups, which he claims are so well differentiated that it is possible to predict the histology from the clinical aspect. These groups are: (1) A keratoid type, with great hypertrophy of the horn-cell zone, some parakeratosis and acanthosis, and flattening of the papillary bodies. This is the most frequent type and much the most important, as more often than the other varieties leading to the development of a prickle-cell carcinoma; (2) A nævoid type, probably the same clinical group as Unna's nævus seborrhœicus, or pigmented senile wart; (3) A verrucose form, with pronounced acanthosis, active proliferation of the cells of the stratum germinativum and the whole rete, and enormous papillary hypertrophy. In all probability the chief part in the production of these lesions is played by strong sunlight and atmospheric changes generally. Sutton finds it a common affection in the middle west of the United States.

The treatment recommended varies according to the phase of the disease. When met with early, the frequent application of a **Bland Salve**, and the avoidance of strong soaps, should be enjoined. In the later and more resistant types, the growth may be softened by the application of an ointment such as the following, which should be applied on lint, covered with oil-silk and kept in position with plaster:—

R	Salicylic Acid	1 part	Vaseline	30 parts
	Sulphur	1 part		

When by this means the hard excrescence has been softened, it may be removed with cotton moistened with benzene. But probably the best method of treating the lesion is by applying **Carbon-dioxide Snow** for thirty seconds to a minute, and then painting with tincture of **Iodine** and **Thymol Iodide**. For the fully developed carcinomatous growths, surgical **Excision** and **Radiotherapy** are the author's choice.

REFERENCE.—¹*Jour. Amer. Med. Assoc.* 1915, i, 403.

KIDNEY, DISEASES OF.

Francis D. Boyd, M.D.

John D. Comrie, M.D.

During the past year the most important work in renal disease has been carried out in America, principally by the analytical technique recently introduced by Folin and Dennis. In an investigation of the non-protein nitrogenous constituents of the blood in chronic vascular nephritis, as influenced by the level of protein metabolism, Folin, Dennis and Seymour¹ carried out observations on a number of individuals selected on account of abnormally high blood-pressure.

The observations extended over three periods: (1) Ordinary diet; (2) High protein feeding; (3) Low protein diet. It was found that by low nitrogen diet it was possible to reduce the urea and total non-protein nitrogen of the blood to the normal or lower in twelve nephritic patients. High blood-pressure was not necessarily associated with excessive nitrogen retention, and there was found no marked connection between the blood-pressure and the degree of retention; indeed, it is doubtful if any such connection exists. A high blood-pressure does not therefore necessarily indicate the desirability of prescribing low nitrogen diets in nephritis. So far as can be seen at present, the only criterion available for regulating the protein content of the food in nephritis is the determination of the amount of retention by blood analysis. The authors find that there is no correspondence between the results of the phenolsulphonephthalein test of kidney efficiency and the degree of waste nitrogen retention. The phthalein excretion may be reduced by one-half or more before there need be any abnormal accumulation of waste nitrogen in the blood.

Tileston and Comfort,² discussing the non-protein nitrogen of the blood, find that in the fasting healthy adult the total non-protein nitrogen varies between 22.9 and 25 mgrams per 100 c.c., and the urea nitrogen between 12 and 14 mgrams. The effect of a full meal with meat in the case of the healthy adult, is to raise the total non-protein nitrogen on an average 4.7 mgrams, the urea 2.5 mgrams. In both chronic interstitial and chronic diffused nephritis the cases without symptoms of uræmia showed normal or undoubtedly elevated values; the uræmic cases, with one possible exception, showed a great increase in both nitrogen and urea. The excretion of phenol-sulphonephthalein was, according to these observers, roughly proportionate to the degree of nitrogen retention. The cases with 100 mgrams or over of total nitrogen all showed 5 per cent or less of phthalein excretion. Many cases, however, with a considerably impaired phthalein excretion showed no signs of retention, and a moderate amount of retention of waste nitrogen often occurred with no impairment of the phthalein elimination. The proportion of urea nitrogen to total non-protein nitrogen in disease varied from 32 per cent to 85 per cent. When the nitrogen was normal, the urea was usually about one-half of the total nitrogen; where it was elevated, the urea usually, but by no means always, constituted 70 per cent of the whole. No reason could be found for these variations. The determination of the total non-protein nitrogen alone is therefore more valuable than that of the urea alone. The estimation of the total non-protein nitrogen is of the greatest value in the diagnosis of uræmia. Amounts of 100 mgrams and over were encountered in only two conditions besides uræmia, namely, acute intestinal obstruction and profound anæmia with hæmolysis. Only one case of uræmia without marked increase in nitrogen was encountered out of a total of eight cases.

Determination of the non-protein nitrogen is a great aid in pro-

gnosis in chronic nephritis. Patients showing over 100 mgrams, with one exception, did not live more than thirty-five days. The results of blood analysis furnish the best guide to diet in nephritis. Cases with considerable retention should be placed on a strictly protein-poor diet, and by this means a return to the normal may be brought about if the azotæmia is not too pronounced. In cases of pronounced uræmia, however, no marked reduction in azotæmia resulted from a protein-poor diet. Nephritis with a normal amount of non-protein nitrogen does not call for a marked decrease of protein in the diet. In chronic passive congestion of the kidneys there is little or no retention of nitrogenous waste products. In pyelitis the presence of azotæmia probably indicates involvement of the parenchyma of the kidney. A marked elevation of non-protein nitrogen renders a patient a poor operative risk, and the azotæmia should be overcome by diet, if possible, before an operation is attempted, in all cases where delay is permissible. In hypertrophy of the prostate, for example, a low protein diet may be combined with drainage of the bladder as a preliminary to operation. Eclampsia of pregnancy seldom shows any marked increase in the non-protein nitrogen. It is therefore distinct from uræmia, and analysis of the blood will differentiate the conditions.

Mosenthal,³ in an extensive research on the nitrogen metabolism in experimental uranum nephritis in dogs, finds that nitrogen excretion may be increased or diminished in amount. An increased elimination is due, not to any previous retention, but to an augmented protein catabolism; a diminished excretion to kidney insufficiency. The laws governing the elimination of nitrogen are not haphazard or 'bizarre,' but such factors as food intake, normal stools, etc., being constant, depend largely on three conditions: the degree of protein catabolism, the chemical combination in which the non-protein nitrogen exists in the blood, and the permeability of the kidney. From various factors it must be concluded that uranum nephritis is a disease which implicates the organism as a whole and not the kidneys alone. Human nephritis presents such a many-sided picture that it seems probable that many of the facts worked out for experimental uranum nephritis are applicable to it. The only claim that can be made for them at present, however, is that they may be considered as suggestions on which to base further observations. In the interpretation of increased non-protein nitrogen of the blood in nephritis four factors are to be considered: (1) The retention of nitrogen by an insufficient kidney; (2) Inspissation of the blood due to loss of water; (3) Increase of protein catabolism; (4) The chemical combination in which non-protein nitrogen exists in the blood. Hitherto general attention has been paid only to the first of these.

Hopkins and Jones⁴ find that protein feeding in nephritis has a direct influence on the retention of nitrogen in the blood. This is most pronounced in the pure chronic interstitial type with hypertension. They find that the estimation of nitrogen retention by blood

analysis is of definite clinical value from the point of view of therapy. Chronic passive congestion of the kidneys does not cause any increase in the waste nitrogenous products in the blood. In the presence of nitrogen retention the phthalein output is usually low and the blood-pressure frequently high. Chronic passive congestion of the kidneys may greatly impair the phthalein output. To be of value, the nitrogen retention and phthalein tests should be repeated at intervals.

Hopkins⁵ reports a study of blood sugar in twenty-eight cases of nephritis, and finds that a slight hyperglycæmia occurs in many high-pressure nephritics, and frequently in those with low phthalein elimination. There is no relation between the height of the blood-pressure and the degree of hyperglycæmia. In most nephritics without high pressure the blood sugar is normal. Œdema and hepatic congestion do not seem to influence the concentration of blood sugar. Nitrogen retention is a frequent accompaniment of hyperglycæmia. Alimentary hyperglycæmia occurred in the majority of the cases where 100 grams of glucose was fed by the mouth.

Fotheringham and Smillie,⁶ discussing the relation between the phenolsulphonephthalein excretion in the urine and the non-protein nitrogen content of the blood, especially in cases of nephritis, bring forward a large number of observations from which they conclude that many cases of nephritis show a normal phthalein excretion and a normal non-protein nitrogen content in the blood. The content of the non-protein nitrogen in the blood varies in a rough way inversely with the excretion of phthalein in the urine in nephritis. The phthalein excretion, however, is influenced by cardiac decompensation and unknown factors, so that quite unexpected results occur in individual cases. The content of non-protein nitrogen in the blood seems to be less influenced by cardiac and other complicating factors, and the amount in the blood is of considerable prognostic value. The height of blood-pressure and pulse-pressure, on the other hand, do not, they find, appear to be of prognostic importance in nephritis.

Peabody,⁷ in a study of acidosis in renal disease, finds that the evidence is against the theory adopted by Straub and Schlayer that acidosis is a cause of uræmia. Several of the cases quoted show that marked symptoms of uræmia may exist without any evidence of acidosis as manifested by the alveolar air or the blood. That slightly low figures for the carbon dioxide tension in the alveolar air may be obtained in mild cases of uræmia is certain, but all evidence goes to show that acidosis of any great importance does not occur except in severe and usually terminal cases. Even where the blood was examined within twelve hours before death the acidosis was not so marked as found in advanced diabetic coma. The development of acidosis in renal disease bears little or no relation to the amount of non-protein nitrogen in the blood. The latter may be extremely high without evidence of marked acidosis being present. Furthermore, the relation is slight between the output of phthalein and the development of acidosis. In several cases the phthalein output had fallen

to zero some time before evidence of acidosis arose. It is only after the excretory power of the kidney has been reduced to a minimum for a somewhat prolonged period of time that the signs of acidosis begin to develop in the blood. There appears to be little relation between the occurrence of acidosis in nephritis and that of dyspnoea. Dyspnoea on exertion was shown in some of the cases a long time before there was any evidence of acidosis, and, on the other hand, when acidosis was present, respiratory disturbance was not a pronounced feature. Occasionally a type of deep, slow respiration was seen, resembling the respiration of typical diabetic acidosis; but the author concludes that in combined cardiorenal disease the dyspnoea is essentially a circulatory feature and the renal condition plays an accessory part.

In discussing the diagnostic value of creatinine in the blood in nephritis, Myers and Lough⁸ point out that the functional condition of the kidney may be ascertained by two different methods of attack: by the amount of certain substances excreted by the kidneys, or by their retention in the blood. Since the introduction of simple but relatively accurate methods of blood analysis by Folin and his co-workers, the later method has received considerable attention. The non-protein nitrogen amounts normally to 25 to 30 mgrams, the urea nitrogen to 12 to 15 mgrams, uric acid to 1 to 2 mgrams, and creatinine to 1 to 2 mgrams, all calculated to 100 c.c. of blood. As illustrations of the extent of retention, the authors have encountered figures of 350 mgrams for non-protein nitrogen, 300 mgrams for urea nitrogen, 27 mgrams for uric acid nitrogen, and 33 mgrams for creatinine nitrogen. The marked retention of creatinine in the blood in uræmia was noted independently by three different groups of investigators. It has long been known that creatinine is excreted in decreased amounts in severe nephritis, the permeability of the kidney to creatinine being decreased. The observers point out that the estimation of creatinine in the blood is of considerable prognostic value, cases showing over 5 mgrams per 100 c.c. of blood having invariably terminated fatally. Of eleven cases showing over 5 mgrams creatinine per 100 c.c. of blood, all terminated fatally in from a few days to a few months. In those cases the phthalein output was practically zero. The authors hold that the increase in the creatinine of the blood should be a safer index of the decrease in the permeability of the kidney than either urea or uric acid, for the reason that creatinine on a meat-free diet is entirely endogenous in its origin. Urea, on the other hand, is largely exogenous under normal conditions, and its formation, therefore, is subject to great fluctuations, the same being true in a measure of uric acid. Estimation, therefore, of creatinine in the blood in nephritis is a simple but valuable diagnostic and prognostic test. The creatinine rises above 2.5 mgrams per cent only in cases of nephritis with severe involvement. Creatinine values of 2.5 to 3 mgrams may be viewed with suspicion, figures of 3 to 5 mgrams regarded as decidedly unfavourable, while over 5 mgrams probably indicate an early fatal termination.

Fine and Chase,⁹ discussing the diminished power of the nephritic kidney for the elimination of uric acid, point out that in normal and gouty individuals, **Atophan** induces an augmented excretion of uric acid in the urine and a decreased concentration in the blood by endowing the renal cells with an increased power for eliminating uric acid. In nephritis, the renal cells which have become abnormal, and whose work is impeded by interstitial growth, would be expected to respond less readily to this stimulus, and it was found in six cases of nephritis that there was diminished or entire absence of response to the administration of atophan on the uric acid concentration in the blood. In the six cases there was a general relationship between the degree of response to the administration of atophan on the one hand, and the extent of non-protein nitrogen retention and the clinical picture on the other.

Soper and Granat,¹⁰ investigating the urea content of the spinal fluid with special reference to its diagnostic and prognostic significance, find from a study of ninety-seven cases that a urea content of higher than 0.2 per cent indicates a severe uræmia and a rapidly fatal termination. A content between 0.1 and 0.2 per cent means a rapidly fatal termination in the majority of cases of nephritis. A content between 0.05 per cent and 0.1 per cent does not permit of any definite conclusion either as regards diagnosis or prognosis. Such a content is, however, suggestive of severe urea retention, and must be taken into consideration in the diagnosis of the condition.

In 1908 Wohlgemuth began a series of studies on the starch-splitting ferment amylase or diastase. He found that the amount of enzyme which was excreted in the twenty-four hours' urine of normal men varied within narrow limits and was almost constant for a given individual. In the urine of nephritis, on the other hand, the amount of enzyme excreted in the urine diminished in proportion to the severity of the disease. Geyelin¹¹ compared the excretion of amylase with that of phenolsulphonaphthalein in a series of cases of nephritis, and found that the results of the tests were essentially similar. Fitz,¹² working with the method of Wohlgemuth and Noguchi, compared the amylase readings of the urine and blood and the non-protein nitrogen of the blood in a series of animals in which experimental nephritis had been set up by the injection of uranium nitrate. He concludes that in uranium nephritis the excretion of amylase in the urine and the amount of non-protein nitrogen in the blood vary from the normal during the nephritis and return to the normal as the nephritis heals. The amylase excretion, like that of phthalein, drops rapidly to its lowest point and returns rapidly to its previous level with recovery of the kidney; it is but little influenced by accumulation in the blood. The non-protein nitrogen accumulates gradually in the blood and returns gradually to the normal as the kidney recovers. Amylase excretion as a test of renal function is similar to phenolsulphonaphthalein, but is less delicate.

Rowntree, Marshall, and Baetjer,¹³ considering the phthalein test and the diastatic activity of the urine, find that the quantitative estimation of the diastatic activity of the urine as it is employed at present shows low values in the majority of cases of mild and severe nephritis, while in cardiac and cardiorenal cases the diastase findings are bizarre. Owing to the frequent occurrence of normal diastatic values in cases in which considerable or grave renal functional involvement is unquestionably present, and of low diastatic values which are not in accord with the clinical course of the case or with findings of other functional tests, no diagnostic or prognostic significance attaches to the test other than that which is corroborative in character. As a single test it is unreliable. The phthalein test is the one of choice.

REFERENCES.—¹*Arch. Internat. Med.* 1914, xiii, 224; ²*Ibid.* 1914, xiv, 620; ³*Ibid.* 1914, xiii, 131; ⁴*Ibid.* 1915, xv, 964; ⁵*Amer. Jour. Med. Sci.* 1915, cxlix, 254; ⁶*Arch. Internat. Med.* 1914, xiv, 541; ⁷*Ibid.* 1914, xiv, 236; ⁸*Ibid.* 1915, xvi, 336; ⁹*Ibid.* 1915, xvi, 481; ¹⁰*Ibid.* 1914, xiii, 131; ¹¹*Ibid.* 1914, xiii, 96; ¹²*Ibid.* 1915, xv, 524; ¹³*Ibid.* 1915, xv, 543.

KIDNEY, MOVABLE. (*Vol.* 1915, *p.* 353.)

KIDNEY, SURGERY OF. *J. W. Thomson Walker, M.B., F.R.C.S.*

Newman¹ discusses *symptomless hæmaturia* arising from tumours, aneurysms of the renal pelvis, calculus, and early tuberculosis. When the bladder is known to be free from disease, and blood is seen with the cystoscope escaping from one ureter only, it is the absence of other symptoms and signs that leads to the suspicion of the hæmaturia being due to tumour. The bleeding is rarely severe in the early stage, and considerable intervals may elapse between the early attacks of hæmaturia, but these become more frequent and severe. The urine is free from pus, but epithelium, cylindrical or pavement blood-casts, or even small fragments of the growth, may be found in the excretion. The absence of pyuria is significant; also the absence of a shadow with the *x* rays. It is impossible to distinguish between a tumour originating in the renal substance and one occupying the renal pelvis. The orifice of the ureter on the affected side may be normal, but sometimes the lips are swollen and blood-stained and the slit elongated. There may be small submucous hæmorrhages in the mucous membrane of the lips. The urinary shoots are coloured with blood, and the coloration may be deepened by manipulating the affected kidney.

In small sacciform aneurysms, no symptoms beyond the bleeding are present to aid diagnosis. The cystoscopic examination revealed one peculiar feature, namely, that when interrupted pressure was made with the kidney between the hands, every time pressure was applied a quantity of blood was seen to flow into the bladder, and when the pressure was withdrawn the flow ceased. This is found in no other condition.

While it is the rule in renal calculus that pain and bleeding go

together, it must be remembered that the absence of pain does not preclude calculus as a cause of hæmaturia. It is important in all cases of hæmaturia to have an *x*-ray examination made by an expert. Beyond the abnormal amount of mucus and epithelial cells, there are usually microscopic quantities of pus which are absent when the bleeding is due to a small papilloma, renal varix, or an aneurysm of the renal artery. Cystoscopic examination shows the blood-stained shoots coming from one ureter, and changes at the ureteric orifice are usually present. The lips are thickened and irregular, and the orifice dilated or elongated, while, as a rule, the urinary shoots are more frequent, and smaller in size than those from the ureter of the healthy side, often in the proportion of 5 to 3.

In tuberculosis the hæmaturia is seldom severe or protracted, is frequently absent for long intervals, is not increased by exercise or relieved by rest, and on standing, the corpuscles and colouring matter are not completely precipitated from the urine. The urine is acid, low in specific gravity, and deposits minute quantities of pus-cells which fall to the bottom of the glass. No *x*-ray shadow is found, and a guinea-pig inoculation develops tuberculosis in three weeks. The orifice of the corresponding ureter indicates clearly the nature of the lesion by changes in the colour and contour of the lips of the orifice, by the size, frequency, and regularity of the shoots, and by the character of the urine which escapes.

Wallace and Dudgeon² publish a series of four cases which support the recognized view that nephritis may cause a unilateral hæmaturia which ceases after nephrectomy, and that renal pain may be caused by nephritis.

Lund³ describes his experience of Rovsing's operation for *congenital cystic kidney*. It consists in exposing the kidney through the ordinary oblique incision in the loin, and puncturing the cysts on its surface as far as they can be reached by retracting the wound. As the cysts are punctured, the kidney is much diminished in size, and may be so reduced that one pole and then the other may be delivered from the wound. The larger cysts and bunches of cysts may be felt, and a hollow needle run into them. Care is taken to avoid areas of normal kidney tissue, whenever they can be seen or felt. There is very little bleeding. Rovsing has reported three cases. In the first the reduction in the size of the kidney was permanent, and albuminuria disappeared. The patient lived in comfort for some time, and then died of uræmia following fever. In the second case the pain and dragging of an enormous tumour was relieved by this operation, and the patient was well two and a half years after the operation. The albuminuria diminished, the urinary excretion tripled, and the urea excretion doubled. In the third case the kidney was reduced in size, the urine and urea increased, the appetite improved, and the colon became healthy. It is not claimed that the disease is cured by the operation, but the pressure of the cysts upon the renal tissue is relieved. Lund operated on four cases, and holds that the operation

is an advance in the treatment of this disease. When both kidneys are involved, only one should be operated on at a time.

Lockwood⁴ describes the following operation for the cure of *movable kidney*. After making the usual oblique lumbar incision for exposure of the kidney, the fascia transversalis is opened, and the kidney sought for. In order to facilitate this, the patient is rolled over until the wound faces the table. The finger is passed over the kidney to separate the perinephritic fascia from the colon and peritoneum, and the perinephritic tissue is taken between the finger and thumb at the lower end of the kidney, which is squeezed upwards within its sac. When the kidney has gone up as high as is judged necessary, the perinephritic fascia is clamped at its lower end with pressure forceps, and ligatures of No. 2 and No. 3 twisted silk are passed round it with a curved needle. Two or even three of these sutures may be passed about half an inch apart. The ends are left long, and used to fix the perinephritic tissue to the abdominal wall. Before applying the pressure forceps, the perinephritic tissue is felt between the finger and thumb, to make sure that the ureter is not included. When the perinephritic fascia has been ligatured, the lower end of the kidney is about the level of the twelfth rib, and moving a little with respiration. Unless it is necessary to explore the kidney, it is better not to open the sac of the perinephritic fascia. The operation is followed by very little shock, pain, or vomiting. The patient remains three weeks in bed, rests three weeks or a month, and this is followed by six weeks' gentle exercise.

Kelly and Lewis⁵ describe a case which illustrates the accuracy of diagnosis of *hydronephrosis* by means of pyelography. There were attacks of pain in the right upper abdomen, but nothing was felt on palpation. The ureteral catheter was arrested a few centimetres below the renal pelvis. About 10 c.c. of a 5 per cent emulsion of silver iodide and 50 c.c. of a 1 per cent mixture of the same substance were slowly injected into the renal pelvis. In the radiogram the ureter shadow was seen to end 1 cm. below the renal pelvis, which was greatly dilated. This represented the site of obstruction, which was due to a kinking of the ureter just below the renal pelvis.

Furniss⁶ discusses the damage done to the kidney by *calculi*. The factors which determine the amount of damage are the size, shape, surface, contour, number, position, mobility or fixation of the stone, and presence or absence of infection. The development of lithiasis is often insidious, and frequently complete destruction of a kidney occurs with very little discomfort or interference with the general health. Small single stones situated in calices which are not infected and have not eroded a blood-vessel cause little discomfort and little damage. When a stone enters the pelvis of the kidney, obstruction is likely to occur, and infection will develop sooner or later. The rougher the stone, and the greater the retention, the more liable is infection to occur.

Cabot and Crabtree⁷ have obtained from the records of the

Massachusetts General Hospital the following facts in regard to the frequency of recurrence of stone in the kidney, after operation. The number of cases operated on in eight years previous to January, 1914, was 155, but full information was obtained only in regard to 87, of which 66 were cases of renal and 21 of ureteral stone. Of the cases of stone in the kidney, 34 (51 per cent) were well, and 32 (49 per cent) were not. Of the cases of stone in the ureter, 15 (71 per cent) were well, and 6 (29 per cent) were not. Nephrotomy was performed in 30 cases, of which 13 (43 per cent) were well, and 17 (56 per cent) were not. Of 33 cases of pyelotomy, 16 (49 per cent) were well, and 17 (51 per cent) were not. Of 12 cases of nephrectomy, 11 (92 per cent) were well, and 1 (9 per cent) was not well. In only one case did stone occur in the remaining kidney after nephrectomy. The length of time during which the stone had been in the kidney did not have any influence in producing recurrence. In patients of less than thirty-five years, the probability of recurrence is comparatively large, while in patients over forty it is comparatively small.

Coryell⁸ has made a study of the pathological aspect of *renal cancer* associated with renal stone, using as material the cases in the Mayo clinic. In nine years and a half there were 140 kidneys removed, containing stones, and of these 9, or about 6.5 per cent, also contained cancer. During the same period 6 nephrectomies were done for cancer of the kidney, one of which was metastatic. The proportion therefore is 9 cancers of the kidney associated with stones to 5 cancers without stones. The author concludes that the stages of development of renal epithelium under the influence of, or as a result of, irritation which is constant and prolonged, are; (1) Normal; (2) Inflammatory; (3) Hyperplastic; (4) Neoplastic. In the kidney there seems to be no distinct line of demarcation between certain stages or phases of a chronic inflammatory process and neoplastic formation. The preparatory phenomena of renal new growth seem to take place not in the area actually irritated, that is, not in the area which shows actual inflammatory reaction, but just beyond it. After having seen the gradual changes from normal tissue to inflammatory, from inflammatory to hyperplastic, and from hyperplastic to neoplastic, it appears probable that the chronic irritation brought on by the stone was the direct cause of the cancer.

Renal tuberculosis with occlusion of the ureter is the subject of an article by Kilbane.⁹ In these cases urine voided by the patient may be clear in gross appearance. Microscopical examination will, however, detect pus-cells, and possibly also blood-cells. In most cases tubercle bacilli cannot be found. In some cases the bladder mucous membrane may be entirely normal in appearance, and the cystoscopic examination negative, except for the detection of an occluded ureter. When it is found impossible to catheterize a ureter, and other conditions appear normal, the question arises as to whether the difficulty results from faulty technique, or because of pathological changes. The examination should be repeated later, if necessary

under a general anaesthetic. Failing this, indigo-carmin, or methylene blue should be used to colour the urine. Two to four c.c. of a 4 per cent solution of indigo-carmin are injected subcutaneously, or 10 c.c. of a 1-300 solution may be used intravenously. Secretion of the dye commences from five to fifteen minutes after injection with normal kidneys, and the colour of the urine gradually changes to a very dark blue. Occasionally the escape of a few drops of lightly coloured fluid may be detected from the infected side, but the difference between this and frequent discharge of a dark-coloured urine from the other ureter is so great as to render undoubted the presence of pathological changes. Every case of silent renal tuberculosis may at any time become active, or the source of infection of other structures. Nephrectomy is therefore the logical treatment for uncomplicated unilateral cases, as soon as diagnosis is possible.

In discussing procedures following nephrectomy, W. J. Mayo¹⁰ refers to *injuries to the third part of the duodenum during right nephrectomy*. The injury is most liable to occur in the attempt to secure the pedicle for the purpose of ligature, and is especially liable to happen when the pedicle is greatly infiltrated with inflammatory products and fluid, in close relationship with the duodenum. It may follow slipping of the vascular pedicle from the forceps, and efforts to grasp the bleeding vessels with toothed forceps. Injury is caused to the duodenum, and perforation follows after some days. No attempt should be made to close the fistula from behind, and no time should be wasted in expectation of spontaneous closure. As soon as the diagnosis is established, the abdominal cavity is opened through the anterior wall, the peritoneum incised to the right of the curve in the duodenum, the duodenum elevated, and the opening closed directly by suture.

Mayo further refers to the method of *ligature of the renal pedicle* by the application of two clamps. In cases where the pedicle is thick and deeply placed, or if the operation be a subcapsular nephrectomy, two forceps are placed on the proximal side, if possible about $\frac{3}{4}$ in. apart, and the kidney cut away. A ligature is then placed round the pedicle beneath the deeper pair of forceps. This pair is removed, so that the ligature slides into the groove made by the forceps and is tied, while the pedicle itself is still safely retained in the distal forceps. A second ligature can then be placed, and the distal forceps removed as the knot is pulled tight.

The *management of the ureter after nephrectomy for tuberculosis* is also discussed. Less than 5 per cent of the ureters in tuberculosis require removal. These are usually cases where a stricture exists in the lower portion of the ureter, close to the bladder, so that there is more or less retention on that side: a condition which obtains in a small percentage of the total number, and which may be differentiated by ureteropyelography. Such ureters should be removed with the kidney at the primary operation. In all tuberculous kidneys which have become closed sacs, or at least have lost their function,

the ureter may be sterilized and dropped into the wound, which may in such cases be closed without drainage. When the kidney is still secreting urine, if there is any evidence of mixed infection, Mayo considers it better practice to attach the stump to the skin, to prevent the possibility of wound infection with tuberculosis and sepsis. Subsequently, the ureter will often discharge more or less for some days, or even weeks, but in practically all cases it will heal spontaneously. Those which fail to close can be removed at a second operation.

Richardson¹¹ reviews the cases, numbering 59, of *perinephritic abscess* operated on at the Massachusetts General Hospital from 1899 to 1913. In the majority there is no definite local source of suppuration, whether in the kidney or in adjacent organs or structures. In this group of cases, sometimes called primary, there are three possible sources of infection, namely, through the lymphatics, through the blood-stream, or from overlooked renal lesions. Trauma may be an important contributory factor, whatever the source of infection, by causing hæmorrhage in the fatty capsule or some other point of lowered resistance. Without minimizing the importance of infection of the perirenal fat from a distance, through the lymphatics, and without implying the frequent participation of the kidney, Richardson calls attention to the following points: The commonest organism, the staphylococcus, producing primary perinephritic abscess, is also the most frequent organism concerned in producing focal cortical abscess in the kidney. Primary perinephritic abscess occasionally follows peripheral pus foci. In such cases it is reasonable to suppose that infection has followed a metastatic hæmatogenous course. A urine normal in clinical examination does not exclude the possibility of cortical renal abscess. The previous occurrence of a peripheral pus focus, due to the staphylococcus, may be of some importance in the diagnosis of continual fever with leucocytosis and lumbar or abdominal pain.

REFERENCES.—¹*Brit. Jour. Surg.* 1915, April, 554; ²*Ibid.* July, 82; ³*Jour. Amer. Med. Assoc.* 1914, ii, 1083; ⁴*Brit. Med. Jour.* 1914, ii, 565; ⁵*Surg. Gyn. and Obst.* 1914, ii, 601; ⁶*Amer. Jour. Obst.* 1914, ii, 716; ⁷*Surg. Gyn. and Obst.* 1915, ii, 223; ⁸*Johns Hop. Hosp. Bull.* 1915, i, 93; ⁹*N.Y. Med. Jour.* 1915, ii, 225; ¹⁰*Jour. Amer. Med. Assoc.* 1915, i, 953; ¹¹*Surg. Gyn. and Obst.* 1915, ii, 1.

KNEE, INTERNAL DERANGEMENTS OF. (*Vol.* 1915, *p.* 362.)

LABOUR, DIFFICULT.

Bryden Glendining, M.S., F.R.C.S.

Impacted Breech.—Jardine¹ has come to the conclusion that the ordinary explanation of impaction in breech cases, when it is generally held that the legs act as a splint, is erroneous. The true explanation is to be sought in a contraction in the lower segment which grips the foetus so that it is unable to escape from the uterus. The impaction is in reality not low down, but rather high up in the pelvis—a finding contrary to the general experience of obstetricians. The uterus can be felt grasping the child in the position of the contraction

ring, where a very distinct ledge may be felt from the inside on introducing the hand into the uterus, about the level of either the knee or ankles. Also on abdominal palpation a distinct sulcus may be felt running across the surface of the uterus. The treatment, when recognized, does not consist in waiting for dilatation of the cervical canal, but in **Dilating the Cervix** under deep anæsthesia. Then a hand is introduced through the dilated canal, and after flexion a leg is brought down with great care, lest the lower segment be ruptured. An important point in delivering breech cases is to have a deep anæsthesia producing relaxation of voluntary muscles, thus permitting direct pressure upon the fundus uteri to drive the head down in a flexed condition, rather than pulling from below, which must tend to the production of an extended head. In the absence of relaxation of the recti muscles, it is impossible to exert pressure upon the fundus uteri.

Cæsarean Section.—The results of all cases of Cæsarean section, 571 in number, performed during the last twenty years by the various surgeons of the Lying-in Hospital of New York, are recorded by Asa B. Davis.² The maternal mortality throughout the series was 10·7 per cent, which compares favourably with the 15 per cent death-rate following craniotomy in the same institute. The foetal mortality before discharge of the mothers amounted to 12 per cent, while the still-births were 4 per cent. In the 35 cases of eclampsia and toxæmias of pregnancy, the mortality under this method of treatment was 37 per cent. Repeated Cæsarean sections were performed in 78 cases: the majority only twice, but in 15 cases it was repeated three times and four, five, and six times in one instance each. Subsequently to Cæsarean section, rupture of the uterus occurred 6 times, with a 50 per cent mortality; and Cæsarean section was required in 9 cases in which some form of suspension operation had previously been performed on the uterus.

Davis uses the high incision through the abdominal wall above the umbilicus and a small incision in the fundus. Thompson,³ writing on this subject, claims the following advantages for it: (1) The recti muscles are close together above the umbilicus; (2) The strain on the scar is less than in the dependent subumbilical region, and consequently hernia is less likely; (3) The rapidly contracting uterus soon drops in the abdomen, and there is little likelihood of the uterus adhering to the parietal wound; (4) The uterus is left *in situ*, and therefore the chances of shock and sepsis are reduced.

Boyd⁴ reviews 48 cases of Cæsarean section with no maternal deaths and a foetal mortality of 4·16 per cent. He attributes the favourable results to the fact that in nearly every case the patient was in good condition. He thinks the risk attached to the operation after labour has begun is little more than before labour, and therefore would advise that in doubtful cases a 'test of labour' should be employed under the direct supervision of the surgeon. Rupture of the membranes increases the risk of infection.

In two cases in which there was undoubted infection, Lawrence⁵ performed Cæsarean section extraperitoneally with complete success. Using the Pfannenstiel incision through the skin and fascia, and splitting the muscle longitudinally, he cuts the peritoneum transversely. Then picking up the peritoneum over the utero-vesical pouch, it is cut transversely, and of the two cut edges, that over the uterus is sutured to the upper layer of the parietal peritoneum, while that over the bladder is united to the lower parietal edge; thus the lower segment of the uterus is exposed, but is shut off by the peritoneal suturing from the peritoneal cavity, and through a longitudinal incision the child is extracted. Drainage of both the uterus and the cavity down to the uterus may be employed if necessary.

When toxæmias of pregnancy, or nephritic or cardiac trouble, render a general anæsthetic dangerous, Cæsarean section may be performed under local anæsthesia. Webster,⁶ in the last two years, using a $\frac{1}{2}$ per cent novocain solution for infiltration of the abdominal wall, has operated with complete success in thirteen cases—one baby dying of congenital heart disease. The uterus, broad ligaments, and round ligaments were less sensitive to pain than the parietes, but not so insensitive as the intestines; traction on these structures induced more pain than simple handling. For incising the uterus, infiltration is unnecessary, as there is usually no pain; removal of the child caused distress rather than pain, and was attributed to the pulling on the uterus inseparable from extraction. Suturing the uterine incision causes no pain.

Forceps.—The indications for forceps at the Jewish Maternity Hospital, New York, in a series of 6000 cases of labour, are given by Arluck and Girsdansky.⁷ Since the introduction of pituitrin, it is thought the percentage of forceps is reduced. Before applying the forceps, what is called a 'test of labour' should always be tried. This varies somewhat according to circumstance, primiparæ being given a longer period of trial, and occipito-posteriors similarly. Other considerations are the consistence of the head; the apparent ease or difficulty of forcing the head well down in the pelvis by supra-pubic pressure; and finally, the condition of rigidity of the cervix. Under such conditions the percentage of forceps cases is reduced to as low as 4.5, while high forceps operations are almost entirely replaced by pubiotomy and Cæsarean section. But in the cases treated by the scopolamine-morphine amnesia the rate rose to 9 per cent, which is nearly double the normal.

Hornstein,⁸ in 2000 cases of labour, found some slight pelvic contraction in 42 women; but of these only 4 required assistance in labour. When the external measurements are all proportional and are small in a woman of slender build, the case deserves a fair 'test of labour,' as they usually have small children, and in favourable presentations delivery is spontaneous.

Pituitrin.—This forms the subject of several communications, mostly of doubtful value when critically considered, as it is seen they

simply record, for the most part, personal impressions. Thus Dueskin,⁹ in a series of cases, draws attention to its value in nearly every conceivable obstetric condition, although he only regards the drug as a 'sensitizer' of uterine muscle, and not, as it is generally held, the direct cause of contraction of muscle fibres. Consequently he employs ergot in combination with pituitrin when a firm contraction of the uterus is desired; and for the same reason he advises massage of the uterus in post-partum hæmorrhage after a sensitizing dose of pituitrin. The drug appears perfectly innocuous, and in the many cases detailed it is difficult to understand how any specific action can in each case be attributed to it. (*See also pp. 18, 26.*)

Induction of Premature Labour.—An inquiry by a committee of the New York Obstetrical Society¹⁰ into the end-results of induced premature labour after one year, dealt with 293 cases, but was not specially instructive. As regards the mother, no instance was found in which either the maternal death or any other effect was attributable to the method employed. In the majority of cases (244 in number), some form of dilating bag was used, to the exclusion of all other procedures. Operative delivery after induction was required in 135 instances. As regards the foetal life, it would appear that the still-born or the deaths soon after delivery were as much attributable to the operative delivery as to the premature induction.

Elderly Primiparæ.—Freeland¹¹ goes into the question of labour in elderly primiparæ (i.e., age 30 and over). The only effects that are directly attributable to the age of the patient are an increase in the proportion of toxæmias and of twins, and also a slight prolongation of labour. There is greater rigidity of the perineum, and consequently greater frequency of perineal lacerations, with increased frequency of forceps application. The three latter are in themselves sufficient to explain a distinctly higher rate of morbidity in the puerperium. The important difference would appear to be in the rigidity of the perineum necessitating forceps and resulting often in lacerations and sepsis. Finally, elderly primiparæ are less successful in nursing their offspring.

Pubiotomy.—Whitridge Williams¹² has from experience become more conservative in the use of pubiotomy. He gives details of cases and a critical analysis in an important article, of which we cannot do better than summarize conclusions based upon the study of thirty labours which followed a pubiotomy in twenty individuals. In a little more than one-third of the cases, there resulted sufficient pelvic enlargement to permit of subsequent spontaneous labour. Pubiotomy is not to be regarded as an elective operation except in funnel pelvis in young women. In contractions of the inlet, cases requiring Cæsarean section should be differentiated from those in whom a spontaneous outcome may reasonably be expected. Pubiotomy should be employed only when the head fails to engage after a prolonged second stage; therefore it does not compete with Cæsarean section at the onset of labour, but is safer than conservative Cæsarean

section late in the second stage. In moderate degrees of pelvic contraction, the field for pubiotomy is in cases seen late in labour and possibly infected. In version or breech extraction in difficult labour, prophylactic laying of the Gigli saw is a useful precautionary measure. Finally, he believes that induction of premature labour can be definitely abandoned in the presence of skilled attention in complicated labours.

Jellett¹³ discusses the same problem under the heading of the treatment of pelvic contraction of the second degree, i.e., cases showing conjugates of $2\frac{3}{4}$ to $3\frac{1}{4}$ in. in flat pelves, and of 3 to $3\frac{1}{2}$ in. in generally-contracted pelves. He concludes that in the absence of special complications pubiotomy is the operation of choice. It is specially indicated in young multiparæ, because of the effect on subsequent pregnancies, and because, owing to the previous labour, there is less likelihood of lacerations. In elderly primiparæ, Cæsarean section is to be preferred on account of the lacerations that are likely to occur, and because the number of future pregnancies is limited. Premature labour is only indicated when for some reason the foregoing are inadmissible. Craniotomy is only allowable when the child is dead.

Scopolamine-morphine in Labour.—This year has brought forth quite a number of articles, all emanating from the American press, on the so-called 'twilight-sleep' induced by the hyoscine compounds and morphia administered during labour. With one exception, all are favourable, although it is evident in each paper that the treatment as at present practised leaves much to be desired and is far from the ideal aimed at. First, all are agreed that only normal cases are for the present suitable, as the drugging masks symptoms of accidental occurrence, while also rendering it difficult, in the absence of frequent examinations, to determine the stage of advancement of labour at any moment. Next, as Wakefield¹⁴ says, the treatment is very exacting and time-consuming; to obtain ideal results, one must be temperamentally fitted and be in a position to drop other work for hours at a stretch, and also have a well-trained staff of assistants. The technique varies slightly in different cases, either as regards the salt of hyoscine and the preparation of morphia used, or as regards the dosage and spacing. The following may be said to represent a standard and serve as a basis on which each apparently works. First, when labour has definitely started, with regularly recurring pains, an initial dose of hyoscine hydrobromide gr. $\frac{1}{150}$, together with morphia gr. $\frac{1}{4}$ to $\frac{1}{2}$, is given, and is followed about three-quarters to one hour later by a second dose of hyoscine alone. Then, according to the amnesia and quietness of the patient, an hour to an hour and a half later a dose of hyoscine gr. $\frac{2}{300}$ to $\frac{3}{300}$, coupled with morphia gr. $\frac{1}{8}$, is administered. From this on, no more morphia is as a rule required; but every hour and a half, or less, the smaller dose of hyoscine is repeated throughout labour. By some, memory tests are applied to determine the degree of amnesia at frequent intervals, while others neglect these tests under the impression that

they rouse the patient. Libby¹⁵ started by working on a time-schedule of administration, but this he had to abandon on account of the deep asphyxia of the infant and the cessation of uterine pains which resulted in some cases. Wakefield¹⁴ aims at getting the patient in a semi-conscious state, roused by each pain but remembering nothing, and this state he maintains by an occasional dose of hyoscine gr. $\frac{1}{400}$ to $\frac{1}{300}$; the basis of success consists in recognizing when this latter dose is due, as memory tests only serve to disturb the patient. (*See also ANÆSTHETICS, p. 88.*)

When nearing the end of the second stage, many patients become excited, even violent and unmanageable, so that Libby¹⁵ and others give chloroform, while Rongy and Arluck¹⁶ employ ether as the head passes the vulva.

Heller¹⁷ is not alone in noting a certain amount of trouble with restlessness, and the thirst in many cases is remarked upon by most writers. It is the rule that labour is somewhat more prolonged, so that the percentage of forceps cases is almost doubled. Asphyxia of the new-born is common, and in 17 per cent (Libby¹⁵) is deep; although all were eventually resuscitated, it was only after vigorous measures were adopted for fifteen to twenty minutes. Some authors use *Narcophin* under the impression that it is less toxic than morphia, but Libby¹⁵ finds no difference in the asphyxias. No death of an infant from asphyxia occurs in this series, but Chrobak is recorded as attributing one foetal death in 107 cases to scopolamine-morphine. As a precautionary measure, Rongy and Arluck¹⁶ watch carefully throughout for sudden slowing of the foetal heart, and then forthwith terminate labour or cease the treatment. The failures are variously given. The best results show at least 10 per cent failures, but other obstetricians record anything from 20 to 54 per cent as unsuccessful.

It is obvious from a perusal of this literature that the treatment leaves much to be desired, both in point of the innate difficulties of orientation, and in respect of the time consumed and of the necessity for quiet, dimly-lighted labour rooms, and finally in the absence of self-control by the patient rendering the chances of self-infection greater and any obstetrical manœuvre difficult without an anæsthetic. A condemnatory attitude towards the treatment is assumed by Baer¹⁸ on the results of 60 cases treated at the Michael Reese Maternity Hospital, where he had no success in 26, little success in 7, partial success in 8, fair in 5, good in 8, and complete success in 6. Headache, sometimes persisting for several days, was complained of in 27 cases; vertigo present in one-half; appalling thirst in 32; restlessness in 18; delirium requiring restraint in 9. He concludes by saying that the prolongation of labour increased in the number of asphyxias, distressing headaches and thirst, the difficulty of avoiding infection in patients not under control, and the uncertain action of the drug, constitute sufficient reasons for condemning its use, while leaving open the merits of a single dose in the early stages of labour.

Ecboic drugs are considered (*p. 17*).

(For Anæsthesia in Labour and 'Twilight Sleep,' see ANÆSTHESIA.)

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LABYRINTHITIS. (See OTITIS MEDIA.)

LACHRYMAL SAC, DISEASES OF. (*Vol.* 1915, p. 366.)

LARYNX.

J. S. Fraser, M.B., F.R.C.S.

Prolapse of the Ventricle of the Larynx.—Gordon New¹ records two cases recently examined in the Mayo clinic. One man, age 71, had suffered from cough for three years, with gradual onset of hoarseness, which had been much worse for six months. There was no pain or dyspnœa, but chronic bronchitis was present, and a radiogram revealed considerable bronchial thickening. Laryngoscopy showed a smooth globular swelling with a broad base, which emerged from under the anterior two-thirds of the right false cord and hung down into the glottis. There was no paralysis of the vocal cords, but the swelling prevented their approximation. The larynx was otherwise normal. The tumour was easily indented with a probe, and could be readily tucked back into the ventricle. The patient refused operation. The other patient, age 59, had complained of hoarseness and cough for six months. He was unable to speak above a whisper, and suffered from dyspnœa. On examination, a smooth, greyish-pink, rounded tumour was seen emerging from beneath the anterior half of the right false cord, lying on the true cord and hanging into the glottis. On replacing the tumour, the voice at once became clear, but on coughing the swelling reappeared. The tumour was gripped by Brüning's forceps, and a wire snare was slipped over it. The tumour was removed close to its base, and the patient's voice immediately restored to normal. Microscopic examination showed normal mucous membrane. New remarks that in these cases a history of much coughing is usually elicited. Koschier says that these tumours are solid or cystic, and that they are due to œdema, chronic inflammation, or to the formation of retention cysts in the mucous glands of the region. They are usually found in the anterior third of the larynx, but may extend the whole length of the ventricle. They may even be bilateral.

Non-diphtheritic Laryngeal Stenosis in Children.—Köck² states that pyogenic infection of the mucous membrane of the larynx may give rise to membranous or phlegmonous forms of laryngitis. The mucous membrane is more severely injured by pyogenic organisms than by the diphtheria bacillus. For this reason **Tracheotomy** should be performed, rather than intubation, when the presence of pyogenic organisms is recognized early. Even if the nature of the bacteria is

only discovered later by cultural methods after intubation has been carried out, it is advisable to perform tracheotomy.

Complete Bilateral Recurrent Paralysis after Diphtheria.—Uffenorde³ records the case of a girl, age 8, who, two weeks after diphtheria, suddenly developed double recurrent laryngeal paralysis. Apparently there was no preliminary stage of dyspnoea (stage of incomplete recurrent paralysis or abductor paralysis). There was complete aphonia, and also non-closure of the larynx during swallowing. She died, owing to inspiration of her oral secretion and food, as the coughing reflex was absent. This was the result of a concomitant paralysis of the superior laryngeal nerve, the sensory nerve of the larynx. Uffenorde remarks that palatal paralysis occurs in 5 or 6 per cent of diphtheria cases, but laryngeal paralysis is very rare. Even when it occurs, the paralysis is usually unilateral and incomplete.

Bilateral Alcoholic Abductor Paralysis.—Uffenorde⁴ records the case of an hotel keeper, age 59, who had for years taken a great excess of alcohol. He complained of breathlessness, cough, and difficulty in swallowing. He suffered from delirium tremens. There was no history of recent diphtheria. There was marked inspiratory stridor, and both vocal cords were in the middle line (abductor paralysis). They were sucked together on inspiration, and blown apart a little on expiration. Examination also showed laryngitis sicca, with pachydermatous thickening at the vocal processes. The liver was large and tender, and the urine contained albumin. Uffenorde entirely stopped the alcohol, and within four days noted slight abduction of the cords. A fortnight later the glottis was much wider, the albumin disappeared from the urine, the liver became smaller, the jaundice passed away, and the alcoholic tremor greatly diminished. Uffenorde remarks that the rapid recovery was characteristic of alcoholic paralysis.

Tuberculosis.—Getchell⁵ reports on cases of phthisis laryngea observed by him at four large sanatoria. At one institution which was reserved for favourable cases, about 4 per cent showed tuberculous involvement of the throat, while at the other institutions the proportion was higher, about 9 per cent. In all instances there was evidence of previous pulmonary disease. The results are given as follows: Out of 157 cases, 57 were improved, 54 were not improved, and 46 died. To show that marked tuberculous involvement of the larynx is not incompatible with prolongation of life, Getchell records the case of a man, age 60, who was operated on in 1904 for laryngeal phthisis. Tubercle bacilli were then found in the sputum. The patient is still alive and able to work in the garden, though the larynx is extensively diseased.

Hoarseness or pain in a person suffering from tuberculosis is strong presumptive evidence of phthisis laryngea. [Recently the abstractor has been asked on two occasions to see patients who were supposed to be suffering from phthisis pulmonalis et laryngea. In each case he found complete paralysis of one vocal cord, but an otherwise healthy larynx. One patient was suffering from aortic aneurysm, and the

other from mediastinal new growth.—J. S. F.] On the other hand, both these symptoms may be absent though the larynx is diseased. In every case the larynx should be inspected, and the possibility of the co-existence of syphilis must not be forgotten. In Getchell's experience, tuberculous infection of the larynx is not accompanied by pallor, but, on the contrary, by redness of the laryngeal mucosa.

Sanatorium treatment is of the greatest importance. As tuberculosis of the larynx is a local manifestation of a disease process, improvement of the local condition is dependent upon the same factors which bring about improvement in the general condition. The first essential is **Rest** for the voice, but this is difficult to obtain except in good-class patients who expect to get well. Excessive use of tobacco has a deleterious effect upon tuberculous throats. With regard to treatment, Getchell advises the use of **Dobell's Solution**—presumably as a spray. He also mentions **Argyrol** (5 to 10 per cent), and **Liquid Petroleum with Menthol**. To relieve pain, Getchell recommends the insufflation of **Orthoform**; **Heroin** (2 per cent solution); or **Cocaine** (2 per cent) as a spray; **Injections** into the superior laryngeal nerve; also **Ice-bags**. Getchell holds that tuberculin has no special efficacy in throat cases. In extensive involvement of the larynx and epiglottis, with ulceration, Getchell advises the following powder: paraformaldehyde 1 dr., orthoform 1 dr., compound stearate of zinc 47 gr., cocaine 10 gr., and sulphate of morphia 10 gr. The epiglottis was **Operated** upon in five cases, in one case at least with great success, as all pain disappeared and complete healing was obtained. In two cases the **Galvano-cautery** was employed, with a fair result. In conclusion, Getchell gives it as his opinion that the faucial tonsils are not the definite factors in tuberculous infection that some hold them to be.

Laryngeal Phthisis and Pregnancy.—Imhofer⁶ concludes that there is no evidence that pregnant women are more susceptible to tuberculous laryngitis than others. On the other hand, the physiological submucous engorgement of pregnancy renders the laryngeal phthisis hyperacute. Labour may aggravate the condition to the point of rapid ulceration, and sudden œdema may necessitate tracheotomy. When a frank tuberculous laryngitis makes its first appearance at the very beginning of a pregnancy, it is probable that neither will the mother survive to full term, nor will the child, if born, be viable. **Abortion**, followed by **Removal of the Ovaries**, has been the practice in the author's clinic in the first five months of pregnancy. In the later months, the prognosis for the mother's larynx is better without abortion. Any surgical treatment, except tracheotomy, must be postponed until after the confinement.

Granuloma.—StClair Thomson⁷ calls attention to the great rarity of innocent tumours of the larynx, and records the case of a male patient, age 40, who had complained of hoarseness for two months. On examination, a pedunculated mobile tumour was seen adhering to the edge of the right vocal cord, just in front of the vocal process.

The growth was ovoid, smooth, purplish, and during inspiration it fell below the glottis. The affected vocal cord moved freely and was only slightly congested. There were some enlarged glands at the angle of the jaw. The growth was removed entire with McKenzie's forceps by the indirect method. The pathologist's report stated that the tumour consisted of fibrin and granulation tissue covered by squamous epithelium, but showed no evidence of malignant change. Four months after, the patient was doing well. Thomson admits that a granuloma is only an inflammatory manifestation, and suggests that it may have originated in a submucous hæmorrhage in a patient who did not give his larynx the necessary rest.

New Growths.—Harmon Smith⁸ points out that there are two types of *laryngeal papilloma*: (1) A diffuse type which fills the larynx and is frequently seen in children. Some of these have broad bases, while others are pedunculated. (2) Simple flat papilloma with but few branching projections, usually very white. This form has a surface cornification such as is seen in warts on the hands, and is observed in elderly men. It should be regarded with suspicion, particularly if there is increased vascularity at the base of the growth. In children, laryngeal papilloma may be congenital. The entire laryngeal mucosa may be affected, and in the great majority of cases they reappear persistently when removed, until some physiological change occurs in the child which brings about their permanent disappearance.

Huskeness of the voice is at first the most noticeable symptom. In children suffering from multiple papillomata, the voice is often reduced to a hoarse whisper. Further, the child is dyspnœic, and may become cyanotic on exertion. Such patients also suffer from irritability, impaired digestion, narrow chest, and reduced vitality.

Thyrotomy was at one time in great favour, but we now know that it is ineffective, besides permanently injuring the voice. It is now considered an absolutely unjustifiable procedure. In adults, removal of the growth, either by direct or indirect laryngoscopy, offers a fair hope of cure; in children recurrence is the rule. Even fulguration is not very successful. In some cases Harmon Smith has applied the fulgurating spark with cocaine anæsthesia alone, and believes that this is the best method if the child is at all tractable. Ether fumes are, of course, highly inflammable, and so the child should be permitted to breathe for half a minute at least after the anæsthesia is removed ere the spark is applied. Unless fulguration is excessive, there is no œdema, but in one case the larynx began to swell, and tracheotomy had to be performed. The writer still holds that the best surgical method for these cases is **Tracheotomy** and non-interference with the growth, as recommended years ago by Hunter Mackenzie. In some cases marvellous results have been obtained from **Radium**. Various local applications have been advised, e.g., alcohol, chloride of zinc, nitrate of silver, iodine, etc., but at best they are very uncertain. Harmon Smith suggests that if an emulsion were made of the growth itself, hypodermic injection might prove beneficial.

The value of **X-ray** examination claimed by Iglauer. (*See p. 52.*)

In cases of multiple papilloma in children, the voice afterwards never attains perfection. When a tracheal tube has been worn for a year or more, the cartilaginous rings lose their rigidity, and on the withdrawal of the tracheotomy tube the trachea collapses on inspiration. This may be largely obviated by frequent removals of the tube during the course of the treatment. When the time has arrived for the withdrawal of the tube, it is advisable to insert a smaller one for a time, and, later, to replace it by a rubber catheter until the subglottic structures have resumed their normal resiliency.

Methods of Operating on the Larynx.—Holbrook Curtis⁹ deals with the old *indirect method*, and states that out of a hundred cases of laryngeal tumour operated on by Morell Mackenzie, sixty-seven were papillomata. Next in frequency occur fibromas and myxomas. Angiomas, lipomas, cystomas, and chondromas are all rare. Singer's nodules can hardly be regarded as tumours. In the treatment of papillomata, which are apt to recur after operation, Holbrook Curtis recommends the application of **Chromic Acid** fused on a probe. Dundas Grant uses 5 per cent **Salicylic Acid** in absolute alcohol. As an aid to the indirect method, Curtis recommends the epiglottis lifter, and states that in many cases the patient must be trained before operation. He should learn to sound 'A' changing to 'E' without moving the tongue, as these vowels bring the cords on the highest plane possible, and give the best view of them. At the word of command the patient should be taught to take a deep breath suddenly, without making any sound or body movement, and with complete relaxation. At this instant the forceps are introduced and the growth is seized—at least if it be in the subglottic region or on the margins of the cord: growths situated on the upper surface are removed during the time that the 'E' is sounded. Curtis gives a short account of the various instruments used in the indirect method.

Chevalier Jackson,¹⁰ who writes more especially on the *direct method* of intralaryngeal operation, holds that every laryngologist should be familiar with every method, and should select for operation that which best suits his personal equation for that particular case. The indirect method can be used only in adults. Its great disadvantage is that the surgeon must learn to move the forceps backwards when the image in the mirror shows that a movement is needed forward. In the direct method all movements are under the control of the eye, and the larynx is seen at its true depth, instead of foreshortened as with the mirror. In children the indirect method is safe, prompt, and accurate, and enables us to deal with laryngeal stenosis due to papilloma or œdema, or to stenosis following tracheotomy or intubation. For adults, Jackson prefers local anæsthesia (8 per cent cocaine, aided by a few touches with 20 per cent cocaine). In a few cases, e.g., the removal of growths which are more or less obliterated by the application of cocaine, a general anæsthetic may be necessary in adults. In children, a general anæsthetic in laryngeal stenosis is

extremely dangerous, because respiratory arrest is practically certain to follow. The prompt insertion of a bronchoscope with artificial respiration, and the insufflation of oxygen through the bronchoscope, will save the patient's life. Jackson holds, however, that general anæsthesia should not be employed, as endolaryngeal operation is not painful.

For adults under local anæsthesia the sitting position is preferable. Behind the patient sits an assistant who supports the head. The patient himself occupies a low stool (or better still, a small chair, the seat of which is much hollowed out). The recumbent posture is preferable in children, an assistant holding the head in a position of moderate extension. Chevalier Jackson prefers the distally illuminated laryngoscope, but this is a matter in which each man must please himself. He gives an illustration of the tissue forceps which he finds most useful. He has duplicate forceps, so that a fresh pair can be handed to him without the delay necessary for removing the piece of the growth contained in the bite of the forceps. The patient's head should be covered with a sterile cap which has an opening opposite the mouth, while the operator should wear a mask and protective glasses. In the first stage of the operation the patient is seated on a low stool facing the surgeon, who holds the laryngoscope in his left hand, and inserts the tube spatula in the middle line and depresses the tongue until the tip of the epiglottis comes into view. In the second stage the spatula is inserted slightly deeper and posterior to the epiglottis, and in the third stage the exposure of the larynx consists in a downward and forward traction with the tip of the laryngoscope. Counter-pressure must not be made on the upper teeth. Jackson prefers the lateral route from the corner of the mouth in stout, muscular subjects with short necks. In these cases he passes the laryngoscope down at one or other side of the tongue. The side selected should be the one opposite to the involved laryngeal wall. For very large growths, Jackson passes forceps at the side of the laryngoscope, but guides them by looking through the tube.

In removing simple growths the arytenoids should be avoided, and the muscular structures injured as little as possible. In case of growths involving the edge of the cord, it may be well to submit the matter to the patient for decision, explaining to him that if they are sliced off even with the surface, the chances of recurrence are greater than if removed more deeply, but deeper removal will temporarily impair the voice. In dealing with laryngeal papillomata, Jackson states that forceps removal has given the best results. A little of the apparently normal mucosa at the base of the growth is also taken away. Jackson admits that in the majority of cases many removals are necessary. Subglottic stenosis is readily amenable to galvano-cautery treatment—the incisions being parallel to the long axis of the trachea. Care should be taken not to touch the cords. Jackson also speaks well of galvano-caustic puncture in laryngeal tuberculosis.

Jackson agrees with Semon and Butlin that **Thyrotomy** is the

correct procedure for *malignant growths*, and that to attempt endolaryngeal extirpation would be a backward step. In cancer cases, endolaryngeal operation is limited to the taking of a specimen for the microscope. It is possible, however, by the direct method to obtain a far better specimen than by the old indirect procedure, a fact fully appreciated by the pathologist.

Suspension Laryngoscopy (see MEDICAL ANNUAL, 1915, 368).—Skillern¹¹ does not believe in administering scopolamine before examining the larynx by the suspension method. He prefers ether given by the colonic method. Suspension is very difficult in short, thick-necked people, and in old people with arthrosis it is absolutely contra-indicated. A good idea of its practicability in a given case can be obtained by first examining the patient with the direct laryngoscope. The operating-table must be one that can be raised and lowered, so that the surgeon may be seated and yet have his eyes on a level with the long axis of the patient's trachea. The clamp on the teeth should be fixed and padded, as otherwise the incisor teeth may be loosened; and while the patient's head is swinging, coughing must be guarded against so that the hook may not be thrown off the cross-bar. The patient, while in the swinging position, should have his shoulders resting on the table. One of the great advantages of the suspension method is that there is plenty of room for the surgeon to use both his hands simultaneously, and that the air passages cannot be flooded with blood. In the discussion which followed the reading of these three papers, Ridpath narrated the case of a patient in whom the tonsils had been partially removed by some incompetent operator. The patient was admitted suffering from serious tonsillar hæmorrhage, which Ridpath found it impossible to stop by ordinary means. The patient was, accordingly, suspended, when the blood gravitated into the post-nasal space. In this way a clear field was obtained and the bleeding vessels were ligated.

StClair Thomson¹² gives it as his opinion that laryngeal growths should be removed 'tuto, cito, et jucunde,' and has no hesitation in saying that the majority of people would detest the direct method, and would not complain of the indirect, if they had experience of both. He regarded the indirect method as most suitable for growths in the anterior commissure, especially when aided by Horsford's epiglottic suture. Jobson Horne expressed the hope that the art of removing laryngeal growths by the indirect method would not be lost, while Semon remarked that this feat was the blue riband of laryngology. Waggett urged the younger laryngologists to take every opportunity of practising with angled forceps, and Donelan stated that it was not at all necessary to have a phantom larynx or other elaborate arrangement for practice, as he had frequently seen Morell Mackenzie 'keeping his hand in' by picking small objects out of a dice-box with the aid of the indirect method. Killian, who was present, said that he still removed the greater number of laryngeal neoplasms by the indirect method.

The only member of the younger school to stand up for the direct method was Dan McKenzie, who believed that the younger men would, in spite of all that had been said by the seniors, still remove most if not all small tumours of the larynx by the direct method. Mackenzie himself could look back on a good many tumours, difficult or impossible to remove by the indirect method, which could easily be got away by the direct method. A pathologist whose clientèle lay largely among laryngologists had remarked that before the introduction of the direct method, a large number of the specimens submitted for his opinion consisted of healthy laryngeal mucous membrane, but since the direct method was used, practically all the laryngeal specimens submitted consisted of pathological tissue.

Thyrotomy.—StClair Thomson¹³ stated that he injected the line of incision with a mixture of eucaine and adrenalin, and found that he did not require to tie any vessels throughout the operation. After trying various general anæsthetics, he had reverted to chloroform. The incision was carried down to expose the thyroid and trachea, and then the latter was stabbed with a hypodermic needle attached to a syringe which contained 2 per cent cocaine. If one had patience to wait for a little while, this intratracheal injection abolished the very inconvenient spasm which used to occur on opening the trachea. Thomson does not use Hahn's tube, but, after splitting the thyroid cartilage, he packs in from above a tethered sponge on to the tracheotomy tube which is already in position, and thus prevents blood from getting into the lower air-passages. He then performs a sort of submucous resection, detaching the perichondrium from the inner surface of the thyroid cartilage, commencing close to the thyrotomy opening in front and undermining the cord upwards, downwards, and backwards as far as the vocal process of the arytenoid. He then clips below and above the growth with curved scissors, and finally, round the back of the tumour with the same instrument.

Semon advised that in excising the growth the first cut should be made below, so that if there were much bleeding it would not obscure the second semicircular cut above. William Hill stated that in one case, to get beyond the growth he had to remove the arytenoid cartilage, and found that as a result of this there was considerable trouble with swallowing, which necessitated the giving of food through a nasal tube. Dan McKenzie did not approve of removal of the arytenoid, and stated that when the laryngeal growth extended beyond the limits proper to classical thyrotomy, the larynx should be removed.

H. J. Davis has found that when a patient after thyrotomy was lying on his back, food given by the mouth in the ordinary way was very apt to get down into the lung and set up septic trouble, from which thyrotomy patients sometimes died. Semon stated that he fed his patients from the second day by the mouth, but took care to place them on the operated side with the head hanging slightly over

the edge of the bed. The nozzle of the feeder should be introduced into the dependent angle of the mouth. Tilley records a case in which he took away the arytenoid, and the patient lived for nine years afterwards. The patient, however, died of recurrence in the other cord. In 1914, Tilley operated upon a patient on whom Sir Felix Semon had performed thyrotomy fifteen years before. Tilley found necrosis of the arytenoid cartilage surrounded by suspicious granulations, and the patient died nine months later of recurrence. These two cases showed that it was unwise to speak of a 'cure' even when there was no recurrence of cancer within two or three years.

Stuart-Low¹⁴ thinks well of **Dry-cupping** in the treatment of laryngeal conditions, and has had cups made of various shapes and sizes for adaptation to the front and sides of the larynx. Their edges are covered with rubber. The suction force can be varied from an equivalent of 5 to 100 lb. air-pressure. According to Stuart-Low, the vascular arrangements of the larynx are especially suitable for the application of dry-cupping. The cups should be applied over the posterior half of the thyrohyoid membrane and over the cricothyroid membrane both laterally and in front. Brief notes of four cases are appended. When the treatment is first commenced, the cup should be applied for one minute only, until the effect on the skin is observed. Many cases can bear the treatment for at least five minutes.

REFERENCES.—¹*Laryngoscope*, 1915, 145; ²*Münch. med. Woch.* 1914, No. 33; ³*Zeits. f. Ohrenheilk.* lxxii, 55; ⁴*Ibid.* 53; ⁵*Boston Med. and Surg. Jour.* 1915, i, 782; ⁶*Arch. Internat. de Laryngol.* 1914, June; ⁷*Jour. Laryngol.* 1915, 425; ⁸*Jour. Amer. Med. Assoc.* 1914, ii, 2207; ⁹*Ibid.* 1922; ¹⁰*Ibid.*; ¹¹*Ibid.* 1923; ¹²*Jour. Laryngol.* 1915, 44; ¹³*Ibid.* 72, 162; ¹⁴*Lancet*, 1915, i, 178.

LARYNX, WOUNDS OF. (See THROAT AND NOSE, WOUNDS OF.)

LEISHMANIASIS.

Sir Leonard Rogers, M.D., F.R.C.P.

W. S. Patton infected a dog with kala-azar by injection of spleen pulp from a fatal case. During the four days before the death of the dog, five hundred or more parasites could be found in every film of its blood; so two hundred dog-fleas (*Ctenocephalus filis*) were fed on the dog and their guts searched for development of the parasites, with the result that they were found to degenerate rapidly and disappear within eight hours without showing any trace of development. As Laveran and Franchini have recently shown that it is possible to infect dogs with a natural flagellate of the dog-flea, and thus to produce a disease similar to canine kala-azar, it is now clear that the hypothesis of Nicolle and Basile that dog and human fleas can transmit human kala-azar to dogs is based on very slender evidence.

F. P. Mackie has published a series of papers on his researches on kala-azar in Assam. The first deals with the distribution of cases in a group of infected villages, and he agrees with previous observers that the disease is a household one, or at least a personal one. He next records and illustrates with a coloured plate some bodies he

found in mucus in the stools of kala-azar patients in whom dysentery-like symptoms were induced by the administration of croton oil. They were numerous in 8 and scanty in 8 more out of 84 patients submitted to this somewhat drastic treatment. Professor Minchin reported that in one case the bodies had considerable resemblance to Leishman-Donovan parasites, although in the other two slides he would not like to identify them as such without experimental evidence that faeces containing them could produce infection with the disease. With regard to the other two slides he could not commit himself. In a further paper, Mackie deals with the experimental infection of animals, and records experiments by feeding susceptible animals on the mucus from the stools of kala-azar patients carried on for over a year with negative results. On the other hand, by intraperitoneal injection of fresh human spleen pulp obtained at a recent post-mortem, and containing very large numbers of kala-azar parasites, he succeeded in infecting monkeys, flying foxes, dogs, and white mice, although not sufficiently often to enable this plan to be used safely for determining if any material contained the parasites. On the other hand, his results were negative in the case of young cats, goats, and a young pig. The bodies of over one hundred dogs selected from kala-azar villages were carefully searched for parasites, with a negative result. Further, the intestinal contents of 3,673 verminous insects from kala-azar patients were injected into eight monkeys, also with a completely negative result. Another paper deals with insects and kala-azar, and embodies the results of very extensive series of experiments, unfortunately with entirely negative results as far as the development of the kala-azar parasites in them is concerned. Over one thousand body lice, head lice, and wild bed-bugs were dealt with, and several hundred laboratory-bred bugs, mosquitoes, and sand-flies, and sixty-nine leeches, all fed on kala-azar patients, or caught on them, were examined microscopically, while the majority of their remains were injected into susceptible animals, with negative results. In two bed-bugs undeveloped parasites were found. In some of the sand-flies, herpetomonas, bodo-like and sporozoon-like protozoa, were met with as natural infections unrelated to kala-azar.

In another paper Mackie records having found Leishman-Donovan parasites in the peripheral blood of 24.4 per cent of 245 typical probable and suspicious cases. Among 36 tea-garden coolies they were found in 23 cases. When in polynuclears they showed degenerative changes. Even in typical cases repeated examination may fail to show the parasites in the blood. He regards this work as "but an introduction to the subject, which requires an infinite amount of further investigation." Unfortunately the war has cut his work short.

W. S. Patton tabulates 84 cases of kala-azar in which the parasites were found in the peripheral blood by examination of films taken daily from the finger in such a way as to collect as many of the leucocytes as possible at the end and sides of the blood film, staining deeply

with Romanowsky's stain, and examining with a dry objective (Leitz No. 6 or 7). In 42 the parasites were detected in the first slide, in 13 in the second, in 12 in the third, in 11 in from the fourth to the sixth slide, and in the remaining 6 in from the seventh to the twentieth slide. They are more difficult to detect in cases with marked leucopenia, as they are nearly always found in the leucocytes.

W. D. Sutherland and G. C. Mitra have examined the Wassermann reaction in 38 cases in which the parasites had been found in splenic material by competent observers, and obtained 10 positive and 28 negative results. Only 2 of the 10 gave more than a slightly positive reaction.

J. B. Christopherson records a case of naso-oral Leishmaniasis and one of Oriental sore, both originating in the Egyptian Sudan.

P. W. Bassett-Smith, in opening a discussion at the British Medical Association on Leishmania infection, gave an interesting *résumé* of the subject, and reported a case of recovery after three years' illness.

R. G. Archibald,¹ working in the Sudan, discovered that various animals could be infected by intraperitoneal injections of the parasites. The cultures show considerable vitality, and under unfavourable conditions they revert to a cystic stage. Epidemiological and experimental evidence in the Sudan is not in favour of the disease being insect-borne, but rather supports the view that the intermediate host is an inhabitant of water. Wenyon² has passed the Indian form of parasite through five dogs, and recently he found a few characteristic flagellate forms in the bone-marrow, such as have previously been found in the dermal form, especially in South America.

G. di Cristina and G. Caronia³ have treated 8 cases of kala-azar with intravenous injections of 1 per cent solution of **Tartar Emetic** in doses of 3 c.c., gradually increased to 10 c.c., at two- and three-day intervals, and report 5 as cured and 3 greatly improved.

Castellani⁴ also records a case in which he used a mixture of tartar emetic with various other drugs, and improvement followed, which he now attributes to the tartar emetic.

L. Rogers^{5, 6} reports the independent use of tartar emetic intravenously, before the reports of the Italian workers reached him, in the Indian form of kala-azar, with promising results. He has also tried inunctions of 5 per cent finely divided **Antimony** in lanolin every two or three days. (In one case the parasites disappeared from the spleen in six weeks under this treatment.) E. Muir⁷ commenced the tartar emetic treatment on reading of the Italian work, and records very favourable impressions of it at Kalna, in Bengal, in addition to turpentine injections to raise the leucocytes, which he thinks increase the rapidity of the results. Out of fourteen cases, one hopeless one died, but the remainder rapidly improved, and he thinks some of them are cured.

L. Rogers,⁸ in an earlier paper than the one on tartar emetic, records several years' experience of the leucocyte-increasing methods, **Spleen**

Tabloids and Alkalies, in the treatment of kala-azar. Of the former, *Staphylococcus Vaccines* were the most efficient, a sensitized vaccine being best. The latter was also injected intravenously in a living state in the hope of imitating the cures which sometimes follow a septic infection. Although harmless, this method did not present any advantage over dead vaccines subcutaneously. In some cases spleen-marrow tabloids appeared to be of service. Estimations of the alkalinity of the blood having shown it to be reduced in kala-azar, especially in the late stages, an alkaline mixture composed of drachm doses of sodium citrate and sodium phosphate was given, and in fairly early cases often had a good effect in reducing the fever, with marked improvement in the patients' condition. When the leucocytes increased materially under any of these methods of treatment, the prognosis was greatly improved.

REFERENCES.—¹*Jour. Trop. Med.* 1915, 152; ²*Ibid.* 218; ³*Ibid.* 111; ⁴*Jour. Trop. Med.* 1915, 112; ⁵*Brit. Med. Jour.* 1915, ii, 197; ⁶*Ind. Med. Gaz.* 1915, 364; ⁷*Ibid.* 365; ⁸*Ibid.* 163.

LEPROSY.

Sir Leonard Rogers, M.D., F.R.C.P.

A. Gwyther¹ inquires if there is a primary lesion in leprosy, as in studying the histories of a number of cases he was struck with the frequency with which macules and nodules had rapidly appeared all over the body within a few days. He took notes of 276 cases in the State Leper Asylum at Srinagar, with special regard to the primary lesion. In 122 of these the first sign was a blister with anæsthesia, in three-fourths of which it was on the feet. Anæsthesia alone occurred first in 54 cases, and macules and tubercles in 30, ulcer with anæsthesia coming next with 21 cases. In 81.4 per cent the primary lesion was on the feet or hands, while a further proportion were also on parts exposed to injury. In only about 2 per cent was leprosy rhinitis the first symptom. He concludes that there is probably a minute primary lesion occurring some time before the usual symptoms, and overlooked. It is usually a small anæsthetic patch or blister on a part exposed to injury. After some time a general secondary manifestation of the usual symptoms supervenes.

James A. Honeij² has made a close study of the pulse and temperature in leprosy. He describes 'toxic-febrile' attacks, often followed by severe lesions, and attributes them to a vasoconstricting action through the nervous system.

H. Fraser and W. Fletcher recorded last year negative results from all attempts to cultivate the leprosy bacillus on the media recommended by those who claim to have succeeded. They have now experimented with cultures of the supposed leprosy bacilli supplied by Kedrowsky and Bayon, and found that the same lesions are produced in the animal, said to have been infected, with dead as with living organisms, while smegma and Rabinowitsch's organisms also produce similar lesions. They conclude that there is no evidence that Kedrowsky's bacillus causes leprosy.

TREATMENT.—C. E. Iredell³ records the use of **Radium Diathermy** in a case of leprosy in a medical man. A leproma over which radium was applied broke down and discharged lepra bacilli, and then healed. The patient was also under the impression that diathermy gave him relief, especially as regards pain in the arm.

V. G. Heiser⁴ records successful results in the treatment by means of intramuscular injections of **Chaulmoogra Oil** mixed with equal parts of **Resorcin** and **Camphorated Oil**, which are mixed and dissolved with heat on a water-bath and filtered. The injections are made into the buttocks weekly, beginning with 1-c.c. doses, increasing to the limits of tolerance, and continuing for many months. In 11.11 per cent apparent cures were obtained. (Better results are said to be yielded when given hypodermically than orally, see p. 11.)

REFERENCES.—¹*Ind. Med. Gaz.* 1915, 41; ²*Boston Med. and Surg. Jour.* 1915, i, 668; ³*Lancet*, 1914, ii, 1299; ⁴*Ame. Jour. Trop. Dis.* 1914, 300.

LEUKÆMIA.

Herbert French, M.D., F.R.C.P.

Several observers have drawn attention to the fact that the blood-picture of lymphatic leukæmia may be simulated closely during various acute infections; to such a degree, indeed, that the supervention of fatal leukæmia may be feared until the patient recovers from the acute disease, and simultaneously shows a return of the blood-picture to normal. G. R. Ward¹ discusses this clinical phenomenon under the heading of "secondary or symptomatic leukæmia." In secondary leukæmia the full picture of primary leukæmia is rarely met with. The secondary leukæmias fall naturally into two classes—viz., secondary lymphæmia and secondary myelæmia, these being the usual divisions also of primary leukæmia. The former seems to be especially associated with septic diseases, the latter with cancer.

Ward holds that primary leukæmia, of which the cause is not established, may be due to some micro-organism which will eventually be identified. Then all leukæmias will take their proper places as symptoms of the specific infections or other disease processes with which they are associated.

Klieneberger² records a case of a woman of 23, suffering from syphilis with symptomatic leukæmia. Under mercurial treatment an extreme degree of ulcerative stomatitis supervened, with ultimate death from purulent bronchitis and pneumonia.

SYMPTOMS.—An exhaustive analysis of fifty-nine consecutive cases of leukæmia is given by Pantou, Tidy, and Pearson,³ who divide the types into four groups, namely, acute myeloid, chronic myeloid, acute lymphoid, and chronic lymphoid. These they subdivide into various sub-groups. There is a close inter-relationship between the different types, and the same patient may present different types at successive stages; at any rate, acute lymphoid and acute myeloid leukæmia may be clinically indistinguishable, and so may chronic lymphoid and chronic myeloid.

Bence-Jones's albumosuria is most familiar in cases of myelomatosis,

or of secondary growths in bones ; but it may also occur with other affections of bone-marrow ; and Boggs and Guthrie⁴ have found it in some cases of leukæmia. In a series of fourteen leukæmic patients they found it in four instances—one chronic lymphatic and three chronic myeloid. They did not find Bence-Jones's proteid in the urine in any of the acute cases.

Moorhead⁵ reports a very favourable result of **Benzol** treatment in a case of splenomedullary leukæmia, and unfavourable results in cases of lymphatic leukæmia. In the former there was a slight increase of white cells immediately after starting the benzol ; the latter decrease occurred in an irregular way. A drop from 132,500 to 76,000 occurred in three days ; and another sudden fall from 18,500 to 9375 took place within four days. Coincident with the drop in white cells, a slow but steady increase in red cells and in hæmoglobin took place ; and the change in the differential leucocyte count was striking—on several occasions no myelocytes, previously numerous, could be detected, and the blood-picture was practically normal. Doubtless the result will prove temporary ; but so far as it goes it indicates that benzol was valuable. During the period that benzol was being taken the albuminuria cleared up completely. The urine during this time became quite dark when allowed to stand for twenty-four hours, due, presumably, to hydroquinone. When the benzol treatment was stopped, although the blood was practically normal, the spleen was still considerably enlarged, extending almost half-way to the umbilicus. X-ray treatment was therefore started, and brought about rapid reduction. At the time of leaving hospital, the spleen could be felt about a fingerbreadth only below the ribs. The patient then felt and looked perfectly well.

In the lymphatic leukæmia case, that of a man, age 56, benzol reduced the leucocytes from 222,500 to 7200, but the patient died in much the same way as if he had had no treatment, though for a short time his general health was improved considerably.

Spiegler⁶ reports a case of splenomedullary leukæmia in which, notwithstanding the fact that the leucocytes were reduced from 150,000 to 1400 per c.mm. by benzol, the patient did not benefit in the least, but died with toxic symptoms ; and at the post-mortem examination the appearances found were typical, not of leukæmia, but of severe toxæmia.

Many other observers, on the other hand, have found no ill-effect from benzol in leukæmia, but, on the contrary, great improvement in the patient's general condition and sense of well-being, and also a great diminution in the leucocytes, which may, or may not, by itself be an indication of improvement in the leukæmic state. Corbin,⁷ for example, reports a case in a woman, age 64. She was under benzol treatment from April 19 to June 27, during which period her hæmoglobin rose from 60 per cent to 90 per cent, her white cells fell from 591,000 to 8800 ; previous to this she had had x-ray treatment with benefit for a time, but had relapsed and was in a parlous state, with

pyrexia and semi-coma, before benzol was begun. No other drug nor any other treatment was given at the same time; 5-min. doses were given for four days, 10-min. doses for succeeding four days, and 15-min. doses for the remainder of the time, with diminished frequency at the later stages. At no time did the patient complain of any disagreeable sensation, or of any digestive disturbance, ascribable to the drug. By the end of the course the spleen, previously large, could no longer be felt. It seems that impure benzol contains nitrobenzol, aniline, and other toxic substances; these may be responsible for grave ill-effects; it is important to use none but pure benzol, and with this the benefits in leukæmia may be remarkable. De Crespigny⁸ reports two favourable cases of a similar kind. Neither case was anything like a cure, but the treatment was certainly beneficial to the general health as well as to the blood-picture. F. H. Smith⁹ reports two cases: one was splenomyelogenous leukæmia in a boy of 13, who improved: the other, lymphatic leukæmia in a coloured man, age 56, in whom the benzol treatment had practically no influence at all. H. D. and J. D. Rolleston,¹⁰ on the other hand, report a case in which lymphatic leukæmia was benefited by benzol just as myeloid leukæmia may be. The relief was temporary, however. F. H. Smith¹¹ writes that his patient, a boy of 13, with splenomedullary leukæmia, was still strong, well, and going to school nineteen months after benzol treatment was begun; the leucocytes had been 499,000 to start with, but were still only 13,800 at the end of the nineteenth month, having remained persistently near normal for nearly a year and a half. As regards dosage, Smith lays stress on giving enough and not too much. He regards less than 20 drops three times a day as wholly ineffectual, and more than 25 drops three times a day as unnecessary.

Mühlmann¹² reports unfavourable results with benzol in a man, age 37, suffering from lymphatic leukæmia. At the autopsy, extensive fatty changes were found in the liver, and these were considered to be due to the toxic effects of the benzol. Altogether, 175 grams had been taken in the six months over which the treatment extended.

Krokiewicz¹³ also speaks with but faint praise of benzol. Benefit resulted, but it lasted only a short time. He reports two cases, one a man, age 30, the other a woman of 40, both suffering from splenomedullary leukæmia. The influence upon the blood picture was much less pronounced than it has been in other cases. In the man the hæmoglobin diminished from 66 to 42 per cent; and the leucocytes fell only to 232,000 from 330,000; in the woman the hæmoglobin rose from 45 to 55 per cent, and the leucocytes from 390,000 to 440,000. The man's spleen shrank rapidly, but the woman's remained unaltered. In both cases the temperature, which had previously been raised more or less, became normal under the treatment; and it is likely that this was responsible for the patients feeling better, although the course of the disease was not otherwise altered very much. Krokiewicz lays stress on the fact that benzol is no specific for leukæmia, though it is a useful therapeutic adjunct even if its beneficial effects are but partial and transient.

Barker and Gibbes¹⁴ report a case of splenomedullary leukæmia in a man, age 57, treated by benzol, with a favourable result. Sappington and Pearson¹⁵ record three cases of leukæmia treated with benzol, with and without x rays and other measures. They gave Merck's medicinal benzol in gelatin capsules in two cases, and in olive oil in the third. The dose was 2 to 4 grams a day, and none of the patients suffered from the drug. One patient, a woman, age 42, suffering from acute lymphatic leukæmia, did not react at all, but died under treatment. The other two seemed to benefit to a certain extent. These observers are able to speak with only slight favour of the benzol treatment of these cases.

The fact that **X-ray** treatment in leukæmia leads to great reduction in the numbers of the white corpuscles in the blood, and to remark-

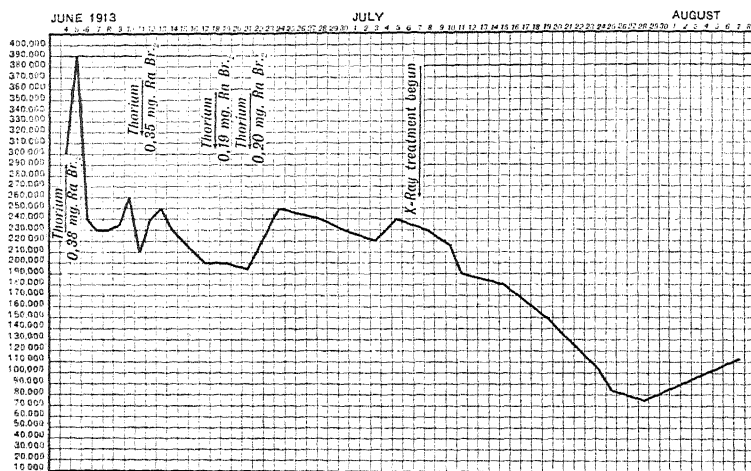
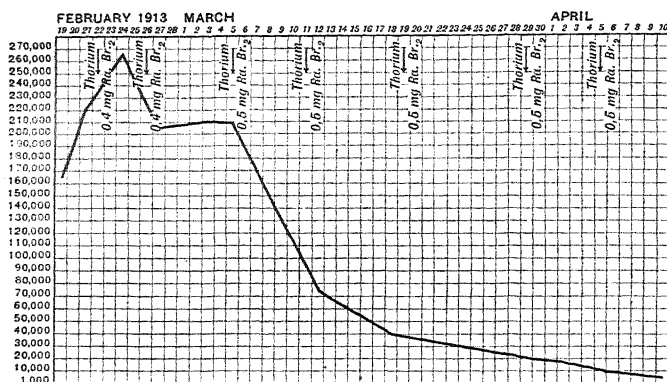


Fig. 41.—Chronic splenomedullary leukæmia: treatment with thorium- x and with x rays.

able diminution in the size of the spleen, is familiar; but in no case has the treatment cured the patient, nor even prolonged life to any marked extent. It is of much interest, therefore, to know the results of pathological investigations into the reasons why this is so, and into the actual changes which the x -ray applications produce. A good deal of experimental work has been done upon the effects of Röntgen irradiations in animals; but of more importance still are researches such as those of Warthin,¹⁶ who finds from examination of leukæmic tissues after exposure to x rays that prolonged irradiation of the hæmatopoietic organs in leukæmia causes first a degeneration of the young and maternal cells, leading to a great decrease in the output of leucocytes, particularly in myelæmia. To this destructive effect there follows a reaction in which cells of a more resistant type are formed, but the essential leukæmic process remains unchecked, although altered in character.

The use of Thorium-x in the treatment of various blood diseases, such as leukæmia, lymphadenoma, and pernicious anæmia, was lauded when it first came in ; but, as is so frequently the case, the original promise is not being maintained. Rosenau,¹⁷ for instance, tried it in four cases of chronic splenomedullary leukæmia. He considers it to be helpful to some extent, but is much more inclined to advise x-ray treatment. The greater influence of the latter than of thorium-x upon



Whether the patient is necessarily better because his leucocyte count is made to approach nearer to normal is open to doubt; but so far as one can judge, the thorium- α did seem to do Rosenau's cases some good. One difficulty was to decide upon the dosage. Some makers measure the dosage by the equivalent strength of radium α rays; others by the equivalent strength of radium γ rays. Rosenau himself employed doses, given intravenously, of thorium- α equal in strength to the radio-activity of 0.5 mgm of radium bromide, and he never found any ill-effects.

Repeated **Blood Transfusion** is suggested for chronic lymphatic cases (p. 9).

REFERENCES.—¹*Lancet*, 1914, i, 1459; ²*Münch. med. Woch.* 1914, 1159; ³*Quart. Jour. Med.* 1914, July, 340; ⁴*Johns Hop. Hosp. Bull.* 1913, 368; ⁵*Brit. Med. Jour.* 1915, i, 410; ⁶*Wien. klin. Woch.* 1914, 458; ⁷*Austral. Med. Gaz.* 1913, 218; ⁸*Ibid.*; ⁹*Jour. Amer. Med. Assoc.* 1914, i, 921; ¹⁰*Brit. Jour. Child. Dis.* 1915, 33; ¹¹*Jour. Amer. Med. Assoc.* 1915, i, 1734; ¹²*Deut. med. Woch.* 1913, 2083; ¹³*Wien. klin. Woch.* 1913, 1799; ¹⁴*Johns Hop. Hosp. Bull.* 1913, 363; ¹⁵*Jour. Amer. Med. Assoc.* 1914, ii, 143; ¹⁶*Amer. Jour. Med. Sci.* 1914, i, 72; ¹⁷*Münch. med. Woch.* 1913, 2214.

LICE.

Anisol said by Labbé to be the best parasiticide (p. 3).

LICHEN PLANUS.

X-Ray treatment (p. 57, *See also Vol.* 1915, p. 381).

LIP, CANCER OF. (*Vol.* 1915, p. 383.)

LIVER, DISEASES OF.

O. C. Gruner, M.D.

Diagnosis of Functional Efficiency.—The elaboration of clinical methods for estimating the degree of functional power of the liver by means of various excretory tests has made little or no progress during the last year. McLester and Frazier¹ have attempted to transcribe Whipple's elaborate researches on the tetrachlorophenolphthalein test in animals to human subjects, but without success. Whipple had concluded from his experiments that the test in question was very serviceable within the range of study which he was pursuing. The action of poisons, or of excision of certain ductless glands, upon the liver was effectively determined by the use of this test. On the other hand, there could be no relation between extent of anatomical change and degree of impairment of functional activity. Addis, discussing McLester's results, lays great stress on the excess of urobilinogen and urobilin in the urine, detected in daily observations, as evidence of definite impairment or not of the hepatic function.

Goodpasture² has employed a test for estimating the presence or absence of hepatic disease, consisting in observation of the time interval occupied in the spontaneous disappearance, by solution, of the clot in a sample of blood. This phenomenon of 'fibrinolysis' depends on the fact that after a number of hours fibrin will dissolve up in normal serum. But, whereas in normal blood the clot takes days to dissolve

again, in cases of atrophic cirrhosis the phenomenon appears in from three and a half to five and a half hours. In each case reported, the extent of damage to the liver substance was well marked. These cases also showed a tendency to hæmorrhages.

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1915, ii, 383; ²*Johns Hop. Hosp. Bull.* 1914, 330.

LIVER, SURGERY OF. (*Vol.* 1915, p. 385.)

LUMBAR PAIN. (*See* BACKACHE.)

LUNG, MASSIVE COLLAPSE OF. (*Vol.* 1915, p. 389.)

LUNG, SYPHILIS OF.

Lewis A. Conner, M.D.

Landis and Lewis¹ call attention to a clinical type of lung syphilis which closely simulates early pulmonary tuberculosis. In the five cases reported by them, the symptoms were morning cough and expectoration, blood-streaked sputum, loss of weight, and slight elevation of temperature. In two cases there was also pain referred to the base of the right lung. The physical signs indicated apical involvement, and were not to be distinguished from those of early tuberculosis. The diagnosis was based upon the absence of tubercle bacilli in the sputum, the positive Wassermann test, the presence of syphilitic lesions in other parts of the body, and the striking benefit derived from antiluetic treatment.

REFERENCE.—¹*Amer. Jour. Med. Sci.* 1915, cl, 195.

LUPUS ERYTHEMATOSUS.

E. Graham Little, M.D., F.R.C.P.

Culver¹ draws attention to the frequency of *mucous-membrane lesions* in lupus erythematosus, and in a series of 38 cases the percentage of instances of this was 27 per cent. This is oddly like the proportion found in a series of 56 cases recorded by Thomas Smith, who found *mucous-membrane involvement* in 28 per cent. Culver has so frequently noted exacerbations of the disease in association with gastrointestinal disorder, that he favours the opinion which regards lupus erythematosus as part of a general disease in which internal treatment is as important as local measures, if not more so. He thinks the condition of the gums and teeth has much to do with causation. He makes an interesting observation to the effect that herpes simplex is unduly frequent in cases of lupus erythematosus. In the important discussion which succeeded this paper, there was much support for the view which classes lupus erythematosus as one of the toxic dermatoses, in the same category as erythema multiforme. Vigorous treatment with the **Ultra-violet Light** was preferred by Pusey to any other local measures, **Zinc Ionization** by Ravogli. Several speakers praised freezing with **Carbon-dioxide Snow**, the use of which, however, should be confined to chronic cases. Some members had had good results in individual cases with **Tuberculin** injections, and it is probable that the toxic disturbance which is assumed as cause of this disease in a certain proportion of instances is occasioned by tubercle. In

view of the large percentage of adults who have concealed tubercle, this method is not without risk.

Ravogli² sounds a useful note of warning in a personal experience of a case of lupus erythematosus diffusus, which was accepted as a tuberculide and treated with **Tuberculin**. The Moro test was positive. The patient, a lady, age 24, had an extensive eruption occupying the face, neck, scalp, the arms, legs, and feet. She had a concomitant pulmonary tuberculosis. One injection of $\frac{1}{100}$ mgram of T.R. was given. There was high fever within twenty-four hours, blisters formed on the sites of eruption, leaving extensive excoriations, and the patient died within ten days. The same author states that he had an exactly similar result several years previously with a similar dose of the same preparation, also in a lady. Not unnaturally, therefore, he regards the use of tuberculin for any other than diagnostic purposes, as in the von Pirquet and Moro tests, as dangerous, and deprecates its internal use even in the smallest doses.

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1915, ii, 773; ²*Jour. Cutan. Dis.* 1915, 266.

LUPUS VULGARIS. (See NOSE, DISEASES OF.)

LYMPHADENOMA.

Herbert French, M.D., F.R.C.P.

Bunting¹ associates himself with those who hold the view that Hodgkin's disease is due to a specific diphtheroid micro-organism. Injections of cultures of this organism made from human diseased glands into monkeys produced effects similar to those of early Hodgkin's disease, but these experiments are not yet complete. Bunting holds the view that the changes in the lymph-glands in lymphadenoma are due to the filtration through them of a toxin elaborated by the micro-organisms at some primary focus of infection, so that the gland changes are a secondary phenomenon, an end-result. He believes that the group of glands first infected in this way protects the body from generalization of the toxin elaborated by the infectious agent; and therefore, that excision of these glands is inadvisable in that such procedure exposes the body to more rapid extension of the process, to more widespread glandular involvement, cachexia, and anæmia.

Billings and Rosentov² confirm the results of Bunting and Yates and others in regard to the recovery of this diphtheroid organism from lymphatic glands excised in cases of Hodgkin's disease. They found it in twelve consecutive cases—from three in pure culture, from the remainder in association with a contaminating staphylococcus. They treated a number of their cases with a **Vaccine** prepared from the organism itself, with apparent benefit in some cases.

Yates and Bunting³ are so convinced of the bacterial nature of Hodgkin's disease that they speak of the micro-organism they have isolated from successive cases as *Bacillus hodgkini*; they regard the disease as one of the granulomata due to this organism, just as gum-mata are granulomata due to the *Spirochæta pallida*, tuberculous nodules are granulomata due to the tubercle bacillus, and so on.

TREATMENT.—They give a detailed account of what they regard as the rational treatment of the disease, subdivided under the following headings : (1) An exclusion of liability to reinfection, by removal of the primary source of infection and its portal of entry ; (2) Rapid elimination of at least the major portion of the diseased tissue, with the bacteria and toxins contained in it, in order to prevent further dissemination—surgical extirpation wherever possible ; (3) Destruction of the remaining bacteria by any and every means, especially by x rays, hygiene, and vaccine therapy ; (4) The conversion into fibrous tissue by hygiene and x rays of such irremovable abnormal tissue as cannot undergo resolution—mediastinal masses for example ; (5) To continue treatment for a long time after apparent cure has resulted. They are not enthusiastic about the effects of vaccine treatment in their own cases, and state that no case has yet seemed to do better with vaccines prepared from *Bacillus hodgkini* than when treated by x -rays, etc., without vaccine. [They do not discuss radium treatment, although large doses of **Radium** applied locally have, in the writer's experience, done more good than anything else in causing disappearance of glandular and splenic enlargement.—H. F.]

DIAGNOSIS.—Rosenthal⁴ draws fresh attention to the fact that Hodgkin's disease may start as an obscure abdominal condition which may simulate typhoid fever very closely, and be mistaken for it. He describes a case in point showing the characteristic periodical pyrexia suggestive of relapses. The illness in this type of Hodgkin's disease starts insidiously but fairly rapidly, with lassitude and diarrhoea, the latter being irregular as a rule, though sometimes continuous. There is marked pyrexia, with a periodic apyrexial interval every few weeks. Later the patient develops acute lethargy, liver and spleen become palpable, and there is remarkable leucopenia—the white cells falling to 2000 or 1000 per c.mm. The pulse is apt to be slow in proportion to the temperature, and the urine may even give a positive diazo-reaction. It is not surprising that cases of this type are generally mistaken for typhoid or paratyphoid fever until their later course has been followed, in spite of the fact that the blood-serum is negative as regards Widal's agglutination test both to Eberth's bacillus and to the paratyphoid bacilli.

Bunting⁵ has endeavoured to find diagnostic points in connection with the blood-counts of cases of Hodgkin's disease. He has been unable, however, to detect any feature of the blood in this disease that is a sufficiently constant departure from the normal to be of diagnostic value.

REFERENCES.—¹*Johns Hop. Hosp. Bull.* 1914, 177 ; ²*Jour. Amer. Med. Assoc.* 1913, ii, 2122 ; ³*Ibid.* 1913, i, 1953 ; ⁴*Deut. klin. Woch.* 1913, 2382 ; ⁵*Ibid.* 1914, 173.

O. C. Gruner, M.D.

A careful study of the bacteriology of Hodgkin's disease has been published by L. J. Rhea,¹ of M'Gill University. He has isolated a diphtheroid pleomorphic organism from the lymph-nodes of several

cases. Acute cases show the same organism in the circulating blood. Focal lesions in the mouths of patients may also show similar organisms. The same kind of organism can be obtained from the hyperplastic lymph-nodes met with in diseases other than Hodgkin's, and in tuberculosis. Rhea points out that Bunting and Yates consider this organism the specific cause of the disease, while other observers are less emphatic.

REFERENCE.—¹*Canad. Med. Assoc. Jour.* 1915, 768.

E. Graham Little, M.D., F.R.C.P.

Sibley¹ reports the case of a boy, age 16, with a history of having suffered from an eruption for eight years. This was distributed over the greater part of the body, with the exception of the axillæ, the popliteal spaces, the cheeks, the sternum, the interscapular region, and the scalp. It was most abundant on the back of the neck, the arms, forearms, and hands. Most of the lesions were raised, oval, very firm nodules of a rose to red colour, with a semitranslucent waxy aspect. The teeth were good, and the nails and mucous membranes were unaffected. The eruption spread, and several of the nodules enlarged to form tumours the size of a Tangerine orange. There was a general enlargement of lymphatic glands. The temperature was raised, 100° to 101° being the average recorded. There was moderate itching. The Wassermann and von Pirquet reactions were negative. A lymphatic gland from the axilla was histologically examined, and the appearances supported the conclusion of lymphadenoma. Blood examinations showed a most remarkable degree of eosinophilia (31 and 39 per cent), a considerable degree of leucocytosis (23,000 and 28,600 per c.mm.), but neither in character nor degree warranting a diagnosis of leukæmia.

TREATMENT.—The patient was given large doses of arsenic, up to 12 min. of **Liq. Arsenicalis** ter die, and full pastille doses of **X Rays**. Marked improvement was noted three months later.

REFERENCE.—¹*Brit. Jour. Derm.* 1915, 52.

LYMPHOSARCOMA.

Herbert French, M.D., F.R.C.P.

Moorhead¹ speaks favourably of the use of **Benzol** in lymphosarcoma, but his views are based upon a single case in which *x* rays were employed locally at the same time. He gave large doses of benzol—one drachm per day to start with, increasing rapidly to 5 drachms, without detrimental side effects. Besides enlargement of the spleen and of many groups of peripheral glands, the patient suffered much from stridor and dyspnoea due to mediastinal masses. The result up to the time of publication was as follows: “The glands in the neck have almost completely disappeared, the dullness over the manubrium sterni has gone, the patient's stridor has gone, and the cough and huskiness are much less. The patient sleeps now without trouble, and in every way feels much better. An *x*-ray examination still shows opacity over much the same area as before, but the outlines are appar-

ently less defined. The spleen is no longer palpable. There has been a slight diminution in the white-cell count ; and, so far, no unpleasant symptom has developed from the benzol."

The difficulty is to know whether this improvement was due to the x-ray treatment, or to the benzol, or to both.

REFERENCE.—¹*Med. Press and Circ.* 1914, ii, 654.

MALARIA.

Sir Leonard Rogers, M.D., F.R.C.P.

ETIOLOGY AND EPIDEMIOLOGY.—E. L. Walker and M. A. Barber¹ have carried out very extensive experiments on the transmission of malaria with anopheles of the Philippines, in order to ascertain which varieties are of practical importance in the spread of malaria. Without such knowledge much money may be wasted in measures against varieties which do not play an important part in the spread of the disease. The evidence of the ability of such a common species as *A. rossii* is exceedingly contradictory, although Indian investigators agree that it is not of practical importance. After discussing the evidence regarding the carrying power of different species, they record their own experiments in detail. The majority of the anophelines bred from larvæ were females (56.4 per cent). When only one opportunity of feeding was allowed, 58.7 per cent took a meal of blood. Seventeen different malarial patients were used for feeding purposes, most of the experiments being on malignant tertian malaria, only those with a considerable number of gametes in the blood being used, counts made at the time of feeding showing from 42 to 6090 gametes per c.mm. of blood. The percentage of infections and intensity of them did not vary in proportion to the number of gametes present, so some other factor must have been operative. The quantity of quinine being taken by the patient at the time did not appear to influence the percentage or intensity of the infection. They conclude that *A. febrifer* is the most important malaria-carrier in the Philippines, being three to four times as efficient in this respect as *A. rossii* and eleven times as *A. barbirostris*. Taking into account the distribution and habits of the different species, they conclude that *A. febrifer* is the most important carrier, *A. rossii* probably plays a certain rôle in the dissemination of malaria, while *A. maculatus* and *barbirostris* play but a small part, *A. sinensis* being negligible. It is to be hoped that this important paper will stimulate similar extensive tests in other malarious countries, without which prophylactic measures in the way of destroying anophelines are only too likely to result in much waste of public money.

S. R. Christophers² records an elaborate study of the spleen-rate and other spleen indices based on spleen-counts in India and other countries in which the degree of enlargement of the organ were recorded, and works out curves, and suggests new terms and indices which will be of interest to malarial experts. He concludes that the spleen index is a valuable test of the 'malariousness' of different places.

C. A. Gill³ discusses at great length epidemic or fulminant malaria

and its relationship to immunity. He prefers the term 'fulminant,' first applied to it by Christophers in his study of the statistics of the great Punjab outbreak of 1908 in association with very heavy rainfall. Gill finds that these outbreaks occur mostly in areas of a subtropical nature, where infection is absent for a considerable part of the year, and where a considerable degree of susceptibility may develop during several years of low malarial prevalence, while they are absent from areas where malarial infection is present nearly throughout the year, with a high spleen index and a considerable degree of immunity.

S. P. James⁴ records a year's investigation of mosquito-reduction measures in Ceylon, including culicidæ as well as anophelines, with a view to removing the danger of the spread of yellow fever in case it is introduced, and to lessening the annoyance caused by mosquitoes. He divides these pests into urban and rural mosquitoes, although some of the latter may migrate at certain times into urban areas in great numbers. He found that in the course of four months the mosquitoes could be reduced in experimental areas to such an extent as to cease to be dangerous or even annoying, but that occasionally migration of rural species from without might become a nuisance. In an area in which the ignorant inhabitants thought that his staff had legal powers to make them keep their houses mosquito-free, much better results were obtained. He recommends that a permanent practical entomologist should be appointed by large municipalities to keep down mosquitoes, legal powers being essential to enable good results to be obtained at a reasonable cost.

E. C. Hodgson⁵ records an elaborate report on malaria in the new Delhi capital, with charts and maps. No less than twelve varieties of anopheles have been recorded in this small area. Different parts show much variation in the spleen-rates. The water-logged canal area has a rate of 77 per cent. The Durbar area, which was originally selected as the site of the new Imperial city, and where the foundation stone was hastily laid, has a subsoil water only eight feet below the ground in the dry season, and is under water after heavy rain. Its general spleen-rate is 66 per cent, while it reaches 96 per cent in one village. The percentage of anophelines known to carry malaria was 34 per cent. The southern site, which was ultimately selected for the new city, has a general spleen-rate of 23 per cent, rising in some villages to 48 per cent, and a ground-water level of twenty-four feet. The cantonment area is still higher and has a spleen-rate of 13.7 per cent.

E. L. Perry⁶ has made a lengthy investigation of malaria in the Jeypore Hill tracts in the Madras Presidency, where malaria has long been known to be very intense, and blackwater fever to occur. The aboriginal inhabitants have a high degree of immunity, as in all very malarious places. The most malarious part is a plateau at a level of about three thousand feet, with much dense jungle and very numerous running streams in which malaria-bearing anopheles breed, especially *A. listoni*, which was found to be present in largest numbers in houses

inhabited by human beings, and in less proportion in cattle-sheds. This was the only species found on dissection to be naturally infected. A second plateau to the east at a level of two thousand feet appears to have become less malarious in recent years with opening up of cultivation, especially rice, as small fish destroy mosquito larvæ in the rice-fields.

S. G. Dixon⁷ draws attention to the great activity of ducks in destroying mosquito larvæ in tanks and ponds, those containing them being free from larvæ, while one protected from ducks swarmed with anopheles.

A. Balfour and C. M. Wenyon⁸ criticize the description of parasites by J. W. W. Stephens (see last year's MEDICAL ANNUAL), under the name of *Plasmodium tenue*, from a single blood-film, and consider it to have been only an amœboid form of the malignant tertian parasite, as in two cases they have found similar forms together with typical rings, and in one also typical gametes of that form.

H. Stott⁹ gives a long account of his studies of malaria in Mandalay in Upper Burma, with charts, and details of the technique he uses in examinations for parasites and leucocyte counts. Prisoners in a gaol surrounded by a high wall were nearly free from malaria, while the neighbouring population was greatly affected. One regiment, whose men were given 10 gr. of quinine twice a week, continued to suffer severely, while increasing it to 15 gr. thrice weekly also failed to afford much protection. In another regiment, mosquito curtains, without quinine prophylactically, greatly reduced the malaria.

A. J. Orenstein¹⁰ has tested the value of an attempt to reduce malaria at Daressalaam, with a population of 23,000, including about 1000 whites. There are a number of swamps and wells in which anopheles bred, especially in the rains, when they are innumerable, and cannot be dealt with, so quinine prophylaxis appeared to be the only feasible method of reducing malaria. The blood of all natives living or working in the European quarter was therefore examined for malarial parasites by means of thick films, and all showing parasites were given 15 gr. of quinine daily for six days and twice a week for ten weeks in solution. In spite of this measure the prevalence and mortality from malaria among the European population has steadily increased. Efforts are now being made to reduce the breeding-grounds of anopheles.

J. Hatori¹¹ records an antimalarial campaign in Formosa by means of a microscopical examination of the blood of all the inhabitants for malarial parasites and treating the positive cases with quinine for thirty days. One expert could examine 80 blood films a day. In a little under three years 409,355 examinations were made, of which 2.83 per cent were positive. The result has been a marked decrease in the parasite indices and in the fever-rate in a parallel manner, while the malarial death-rate has decreased, and in some parts no malaria has been reported in the last two years. The people who first opposed the method now bless it. The cost was elevenpence per case treated.

The method has now been made compulsory all over the island by ordinance.

N. Barlow¹² reports on a campaign against malaria at the Cuyamel fruit farm in Honduras—where over fifty per cent of the labour force were infected—based on the early treatment of all cases before gametes had time to form, the microscope being used for diagnosis. After a purge, 20 to 30 gr. of quinine were given for two days, followed by 15 gr. daily for one month, and twice a week for two months more in malignant tertian cases. In cerebral cases, 15 to 25 gr. of a soluble quinine salt, with enough sodium bromide and salt to make the solution isotonic, were given in at least 600 c.c. water intravenously; or if this was impossible it was given intramuscularly, not more than 3 gr. being injected in one position to ensure rapid absorption. They found that three 5-gr. capsules of the bisulphate of quinine were equal to four of the sulphate, and the former was cheaper and more certain. No relapses occurred among 218 patients who took the full three months' course, while all of 116 who took quinine for only one month suffered from relapses. If importations are few the disease can be stamped out by this method.

TREATMENT.—A. C. MacGilchrist¹³ gives a valuable, but highly technical, account of the molecular constitution and pharmacological action of the more important cinchona derivatives. In two further papers^{14 15} he studies the action of the various *Cinchona Alkaloids* on protozoa and their toxicity for guinea-pigs. For the latter animals quino:dine was the most lethal and cinchonidine sulphate and quinine sulphate the least so. Several kinds of protozoa were tried, and each gave similar results, but *Paramæcium caudatum* was found the most suitable, as the sulphates were toxic for these up to dilutions of 1-80,000 within a few minutes, and in greater dilutions within twenty hours. The time within which the majority of the protozoa were killed was taken, as it gave reliable results. Cinchonine sulphate was active up to dilutions of 1-140,000, quinine and quinidine sulphates up to 1-100,000, and cinchonidine sulphate up to only 1-80,000. Later he found that quino:dine was only half as active as quinine hydrochloride. Quino:dine is an amorphous alkaloid remaining after the removal of the four crystallizable alkaloids of cinchona. It was recommended by Prain, and later by Waters (see MEDICAL ANNUAL, 1914), as more powerfully antimalarial than quinine and much cheaper. This is now shown to be erroneous, as MacGilchrist has also found quino:dine much inferior in the treatment of cases of malaria, as well as very much less active against paramæcia.

In a further communication MacGilchrist¹⁶ deals with the relative therapeutic value of various forms of quinine as tested on malarial cases in Calcutta gaols. He gave the drugs in doses proportionate to the weight of the patients, namely, 1 gram per 70 kilos every eight hours for three days, making nine doses in all. He also tried giving smaller and smaller doses, until the point was reached at which the parasites were no longer killed by it. He found that in the case of

all but the synthetic forms the clinical results were in accordance with his previous tests on protozoa, and he places them in the following order of potency, beginning with the strongest: (1) Hydroquinine hydrochloride; (2) Cinchonine sulphate, quinine sulphate, and quinine sulphate are of equal value; (3) Optochin hydrochloride; (4) Cinchonidine sulphate; (5) Quinoidine. The last-named was said by Waters to be several times as strong as quinine, but this is now disproved, and it is found to be the weakest preparation of those tested.

S. S. Cohen¹⁷ recommends **Quinine and Urea Hydrochloride** for intramuscular injection in malaria as superior to oral administration. It is readily soluble and therefore likely to be rapidly absorbed, and as early as 1884 he found that one injection of 15 gr. stopped malarial paroxysms for about six or thirteen days in the case of either variety of parasite. If given four hours before an expected paroxysm it usually prevents it. By the mouth it also acts more promptly than equivalent doses of other quinine salts, but nothing like as powerfully as when given intramuscularly. The best strength is 33·3 per cent of the salt dissolved in boiling water in the syringe, and injected deeply when cool into muscle through tincture of iodine applied to the skin, and sealed with collodion.

H. Stott,¹⁸ working in Burma, found that an average of 6·5 10-gr. doses in the course of two days stopped malarial fever, but that, contrary to the experience of Rogers in Bengal, in a small proportion of cases, namely 7 per cent, the fever lasted over six days under quinine treatment. In rare cases the fever returns in spite of symptoms of cinchonism being induced, when two injections of 10 gr. each of quinine bihydrochloride may be successful in terminating the fever. The effect of a four months' curative course of quinine was that 33 per cent of the men were admitted subsequently for attacks of malaria; but it is impossible to say how many were relapses and how many fresh infections.

M. A. Barber, A. Raquel, A. Guzman, and A. P. Rosa¹⁹ discuss fully the distribution of the commoner anopheles and of malaria in the Philippine Islands, and conclude that malaria is most prevalent where breeding-places of *A. febrifer* and *A. maculatus* abound. They advocate the detection of the malaria carriers and methods to destroy the larvæ, and they found that even stream-breeders can be destroyed by larvicides properly used.

R. M. C. Linnell,²⁰ in a posthumous paper on malaria on rubber estates, recorded very poor results from quinine used prophylactically even in large doses, and advocated interrupted administration of the drug. His paper was severely criticized at the meeting of the Society of Tropical Medicine.

N. Barlow,²¹ having been struck with the value of **Calomel** in malaria, has tried intravenous injections of a little less than one-fourth of a grain of mercuric chloride in a case of malaria, with apparently good result. He thinks it is effective against the gametes. (*See also p. 22.*)

C. C. Bass²² deals with the treatment of dangerous cases of malaria with malignant symptoms, usually including coma. In these, quinine given by the mouth or hypodermically is useless, and the drug must be administered intravenously, in doses of 10 gr. of the hydrochloride not oftener than three times a day, or 5 gr. every four hours. Larger doses are poisonous.

H. Stott²³ reports on five cases of malaria treated with **Salvarsan**. In only one were the gametes apparently destroyed and the patient cured, while in three the men had to be sent on sick leave after the treatment, which he thinks is far inferior to quinine, and is only indicated in the rare cases in which this drug fails even when given hypodermically.

REFERENCES.—¹*Philadel. Jour. Sci.* 1914, Sept. 381; ²*Ind. Jour. Med. Research*, 1915, Apr. 838; ³*Ibid.* 1914, July, 268; ⁴*Ibid.* 227; ⁵*Ibid.* 1914, Oct. 405; ⁶*Ibid.* 456; ⁷*Jour. Amer. Med. Assoc.* 1914, ii, 1203; ⁸*Jour. Trop. Med. and Hyg.* 1914, 1353; ⁹*Ind. Med. Gaz.* 1914, 462; ¹⁰*Jour. Amer. Med. Assoc.* 1914, ii, 1:31; ¹¹*Ann. Trop. Med. and Parasitol.* 1914, Dec. 537; ¹²*Amer. Jour. Trop. Dis.* 1914, 585; ¹³*Ind. Jour. Med. Research*, 1914, Oct. 516; ¹⁴*Ibid.* 1914, July, 315 and 336; ¹⁵*Ibid.* 1915, Apr. 888; ¹⁶*Ibid.* 1915, July, 1; ¹⁷*Amer. Jour. Trop. Dis.* 1914, Aug. 118; ¹⁸*Ind. Med. Gaz.* 1915, 172; ¹⁹*Philadel. Jour. Sci. Sect. B*, 1915, May, 177; ²⁰*Trans. Soc. Trop. Med.* 1915, July, 239; ²¹*Amer. Jour. Trop. Med.* 1915, June, 764; ²²*Jour. Amer. Med. Assoc.* 1915, ii, 577; ²³*Ind. Med. Gaz.* 1915, 250.

MALTA FEVER. (See MEDITERRANEAN FEVER.)

MANIC-DEPRESSIVE INSANITY. (See MENTAL DISEASES.)

MEDIASTINAL DISEASES.

Lewis A. Conner, M.D.

In discussing the physical signs of *chronic indurative mediastinitis*, Howard¹ directs attention to an important auscultatory sign, first described by Perez. This consists of a rough, creaking, to-and-fro friction sound audible by stethoscope over the manubrium when the arms are moved upward and downward, as in the act of artificial respiration. Howard examined a number of normal cases as well as those of various other affections of the mediastinum and thorax, without ever encountering the sign, except in a single case of cardio-renal insufficiency, in which a somewhat similar crunching sound was heard over both the manubrium and body of the sternum. The autopsy revealed no mediastinitis, but did show an acute fibrinous pleuro-pericarditis. The sign was very distinct in the two cases of chronic mediastinitis reported by Howard, and he believes it to be of distinct value in the diagnosis of this disease.

An interesting statistical study of a series of 60 cases of *primary new growth of the mediastinum*, each with necropsy, is presented by Ross.² All of the cases were observed in the Brompton Hospital for Diseases of the Chest. The age of the patients varied from 18 to 70 years. Eighty-five per cent of the cases were seen in persons over 30, and 70 per cent occurred between the ages of 30 and 50 years. More than two-thirds of the patients were of the male sex. In 44 cases the tumour was a sarcoma, in 10 cases a carcinoma, and in

6 the growth was unclassified ; but in not a single instance was the tumour benign ; 32 of the 44 examples of sarcoma belonged to the type of lymphosarcoma. The point of origin of the tumour was much more frequently the anterior than the posterior mediastinum. In 93 per cent of cases the growth invaded some part of the lungs, the right lung being the more commonly involved. Extrathoracic metastases were of frequent occurrence, the liver, pancreas, suprarenals, kidneys, and spleen being the organs most often attacked.

Among the more common symptoms were dyspnoea, pain, hoarseness, and dysphagia. [The omission of cough as a symptom can hardly have been intentional.—L. A. C.] Dyspnoea out of proportion to the physical signs found seemed to be very characteristic of the condition. Sudden œdema of the face and neck was often an early symptom, and is to be regarded as of great diagnostic significance. The superficial veins of the thorax were often dilated and tortuous. Contraction of the pupil was seen much more frequently than dilatation. A laryngoscopic examination will often detect a slight abductor paralysis before there are other symptoms to indicate a pressure on the vagus or recurrent laryngeal nerve. Emaciation was conspicuously absent in most cases. Fever was almost never observed except in the presence of such a complication as bronchiectasis or septic bronchopneumonia. In most cases there were long periods of persistently subnormal temperature. Although hæmoptysis was rarely severe, blood was present, at some time, in the sputum in 63 per cent of the cases. Careful examination of the abdomen for metastases and radiographic examination of the chest were frequently of great assistance in diagnosis. Pleural effusion occurred in 29 of the 60 cases. In 15 instances the liquid was hæmorrhagic. The average duration of the disease from the appearance of the first symptom to the date of death was thirty-two weeks.

REFERENCES.—¹*Johns Hop. Hosp. Bull.* 1915, 140 ; ²*Edin. Med. Jour.* 1914, xiii, 444.

MEDITERRANEAN (UNDULANT) FEVER.

Sir Leonard Rogers, M.D., F.R.C.P.

P. W. Bassett-Smith¹ has written a summary of recent work on this disease, which he prefers to call undulant fever, as suggested by Hughes. In addition to the countries bordering on the shores of the Mediterranean, the disease is now known to occur in North-west India, China, the Philippines, the Sudan and East Africa, South Africa, and in America in Texas, New Mexico, and Peru. In practically all the endemic centres, herds of goats are found through whose milk infection usually occurs. The organism has considerable vitality outside the body, and is a dangerous one for laboratory workers, as it may be spread by direct infection or inoculation as well as through milk. Ambulant cases may spread infection through the organisms in their urine. Cows, sheep, horses, mules, and dogs may also be attacked. A *Micrococcus paramelitensis* has been demonstrated, which does not

clump with a serum made with a true strain, but does with one made by injecting the para form. He goes on to deal with the precautions necessary in using the agglutination test for detecting infected animals, which require much control and experience to give reliable results.

P. D. Strachan² records at length his experience of Malta fever during a number of years in South Africa, where he has done so much to establish the frequency of its occurrence. He analyzes the symptoms in 268 cases verified by the serum test, and in a few by cultures from the blood, while he has also demonstrated infection through goat's milk. The largest number of cases occurred in the hot dry months from December to February. Neither vaccine nor other treatment appeared to affect the course of the disease. Purgatives to remove constipation did most good. The removal of goat kraals to a distance from houses, and the avoiding of unboiled goat's milk as a drink, are the best preventive measures.

REFERENCE.—¹*Jour. Roy. Naval Serv.* 1915, Apr. 166 ; ²*S. Afr. Med. Rec.* 1915, 171.

MENTAL DISEASES. (See also DEMENTIA PRÆCOX ; GENERAL PARALYSIS ; PSYCHO-ANALYSIS.) *Bedford Pierce, M.D., F.R.C.P.*

We propose to consider here insanity in its relation to various causes and conditions.

Alcohol and Drugs.—Alexander Lambert¹ describes the results of treatment of alcoholism with a mixture of **Belladonna**, **Hyoscyamus**, and **Xanthoxylum**, accompanied by vigorous catharsis with **Mercurial Purges** at stated times. The patient is not cut off suddenly from his drug, but it is given to him in his accustomed way in gradually diminishing doses. The basis of the treatment is the elimination of the poison, and the free administration of purgatives is essential. After four years' experience, during which 1019 patients have been treated for alcoholism, he claims 80 per cent of successes, whilst of 345 morphinists the successes were 83 per cent. He states that the real solution of the problem begins after the medical treatment is completed. He recommends vigorous **Exercise**, and sends suitable patients to a trainer for physical development.

In an earlier article, Lambert gives the constituents of the mixture he uses as follows : Tinct. belladonnæ (15 per cent), 2 oz. ; fluid extract. xanthoxyli and hyoscyami, of each 1 oz. It is given in small doses, six drops (not minims) every hour for six hours, afterwards increased by two drops every six hours, until sixteen drops are taken hourly and continued day and night, and distinct symptoms due to belladonna appear. The treatment is commenced with five compound cathartic pills and 5 gr. of blue mass, followed if necessary six hours later by a saline. When the bowels have acted freely, the narcotic drug is administered so that about two-thirds of the daily quantity is given in divided doses. At the same time the belladonna mixture is given. Ten hours later five more cathartic pills are given, repeated eighteen hours later, and again twenty hours later. About

this time the stools become green with bile, and 2 oz. of castor oil are given to clear out the intestinal tract. It is not surprising to learn that at this juncture strychnine and cardiac tonics may be required. Lambert maintains that treatment on these lines is infinitely superior to the old methods of rapid or slow withdrawal of the drug. He does not look upon it as a cure of alcoholism or of morphinism, but it is an effective way of eliminating the drug and enabling the patient to make a fresh start. Many patients are psychasthenics, and the problem of their regeneration is a psychological problem, and reached only by psycho-analysis and a patient rebuilding of their distorted views of life. "Each individual case has its own separate problems. This treatment is offered as the best method of unpoisoning the patient and putting him in a position where we can deal with him with a clear unpoisoned mind."

Ernest Bishop,² in discussing the treatment of the morphia habit, states that he has found Dr. Lambert's methods of withdrawing the drug the most successful he has tried. He finds it removes the organic need and consequent craving, and does so, when properly adapted to the needs of the individual, with comparatively little disturbance and suffering.

Lichtenstein³ claims that the first consideration in regard to treatment must be the physical condition of the patient, and he utters a warning against too vigorous catharsis and the administration of depressants. He states that in one hospital in which this line of treatment was adopted, sixteen deaths occurred in one month. The period of addiction is important, as cases with a long history are necessarily more refractory to treatment. Care must be taken to verify the patient's statements as to what he has been taking, as this may be designedly exaggerated. With reference to withdrawal, he is of opinion that cocaine can be removed immediately, and opium smoking stopped at once, without serious difficulty. Morphia and heroin must be tapered off, on account of the danger of cardiac failure. **Strychnine** in $\frac{1}{60}$ -gr. doses is gradually substituted, and in fifteen days all morphia and heroin is withdrawn, regardless of the devotion to, and extent of the habit. After withdrawal, removal to a farm is required for at least a year to complete recovery. Lichtenstein has no confidence in recovery after only a few weeks' treatment.

In a preliminary report, Spitzig⁴ advocates the gradual diminution of alcohol and a substitution of **Sugar** and other carbohydrates. When cane sugar is not tolerated, **Lactose** 1 dr. every two hours is used, together with a diet of sweet fruit, pastry, chocolate, and ice-cream. He claims that sweetened liquors relieve the craving. This craving he considers to be due to biochemical wants which the sugars supply.

Irwin Jeff⁵ gives a general description of the Norfolk State Hospital for Inebriety established by the State of Massachusetts, together with an account of the treatment adopted. The hospital possesses an estate of 1000 acres, and contains three colonies: a hospital colony for recent cases, a detention farm colony for able-bodied men,

and a women's colony. The unit of each colony is the cottage, which is so situated that it is readily grouped with others. There is also a well-organized out-patient department with offices in two large centres of population. This is considered an essential part of the scheme of treatment, and an immense amount of after-care work is done. Thus in one year 2770 visits were paid to the homes of patients who had been discharged, and 130 visits to employers to obtain work for discharged patients.

With reference to treatment, Jeff says: "Believing as we do that the inebriate condition has for its basis disordered mentalization, our efforts are directed in an endeavour to interest the patient in his individual case, and having accomplished this to make the interest self-sustaining. Our experience has shown us that the success of hospital treatment depends upon (1) The ability of the patient to co-operate in treatment; (2) Our ability to introduce some tangible substitute for the desire for artificial stimulation." Excluding patients who have been discharged less than six months, during the past five years 1174 patients have been investigated; of these 64 per cent are to-day working and are either totally abstinent or drinking so little as not to interfere with their work. Practically all these men had, before coming to the hospital, dropped below the class of the self-supporting.

An interesting account of Korsakow's syndrome, with an analysis of thirty cases, is given by Moll, of Pretoria.⁶ These occurred amongst 1868 admissions since 1905. He describes four symptoms as being characteristic of this disorder: (1) Impairment of impressionability; (2) Disorientation; (3) Amnesia; (4) Fabrications. All the cases presented history of alcoholism, but some did not exhibit neuritis, the presence of which he does not think essential.

Moll advises the withdrawal of alcohol at once. In case of great excitement the usual methods are employed, including prolonged **Warm Baths and Wet Packs**. **Veronal, Paraldehyde**, and **Scopolamine** are recommended if needful. **Cardiac Tonics** may be urgently required in some cases. He considers it of little use to attempt active treatment of the neuritis until the patient has reached the second stage, and he then uses local heat with hot sand-bags, or hot-water applications and gentle effleurage under water. When the tenderness of the nerves has subsided, the treatment is more active: **Massage**, active and passive **Movements, Vibration**, and **Electric Ionization**.

Warren Stearns⁷ describes a condition which he terms 'alcoholic amnesia,' which is distinguished from delirium tremens by its longer course, the existence of sluggish pupils and speech-defect, incoherent speech with paraphasia, and marked clouding of consciousness. It is said to be due to recent intemperance, and to end in complete recovery in four to six weeks. It can usually be distinguished from Korsakow's psychosis by the absence of neuritis, and the characteristic amnesia and fabrication.

Epilepsy with Insanity.—Goodall⁸ reports that **Thyroid Feeding** proved of marked value in eleven out of twelve cases of insanity with epilepsy. The patients were kept in bed on ordinary diet, and no other drug was given. The dose was on an average from 20 to 30 gr. daily, and in only one case did the maximum dose exceed 40 gr. in a day. There was loss of weight in almost all the cases reported. There was marked reduction in the number of fits, sometimes by more than 50 per cent, but in no instance did the fits cease entirely. In insanity with epilepsy there are no characteristic changes in the blood-count between the fits; but there is evidence of toxæmia at the time of the seizures, as shown by hyperleucocytosis and hypoeosinophilia, which disappear after the attack passes off. The blood condition therefore corresponds to that found in convalescence from acute infections.

Internal Disorders in Insanity.—In discussing the relation between constipation and digestive disorders, Goodall⁹ states that he has never seen a case in which the mental disturbance antedated the somatic disorder; but he does not deny that it may occur. It is very difficult to obtain reliable information at the outset of the malady, and even if obtained it would be necessary to know something of the medical history of the patient for some time previous to the attack. He refers to the extreme degree of constipation so frequently found in recently admitted patients, and the frequency with which improvement begins when this is dealt with. This is in accord with general experience. Pardo is quoted as having demonstrated by means of carmine that not only is peristalsis slow but the evacuation of the dye is irregular.

Stanford¹⁰ has investigated the production of indigo and allied bodies in the urine, and has shown that the problem is difficult, as the substances concerned are very unstable, and there are daily and even hourly variations in the quantity excreted. There is also reason to believe that indigo-producing substances are excreted in cases which appear free from intestinal disorder, and consequently it is not safe to assume that the reaction indicates digestive disturbance. Goodall also reports, on a series of bacteriological investigations of fæces, that in the majority of cases of mania and melancholia there is an increase of total organisms and of *Bacillus coli* in particular, but there is a diminution of anaerobic organisms and of aerobic spores. There was no evidence that *Bacillus coli*, even in abnormal quantity, was of pathological significance.

Manic-depressive Insanity.—Goodall¹¹ confirms Bruce's statement that at the beginning of an attack of acute mania or melancholia there is distinct leucocytosis with an increase of neutrophiles. He agrees that a rise in the eosinophile count is of good omen, whilst a fall in the neutrophiles is unfavourable.

Macfie Campbell¹² concludes as follows: "In many cases of manic-depressive excitement, the onset of the attack becomes intelligible in the light of a careful reconstruction of the whole situation out of

which the attack has developed. The difficulty of adjustment which leads to the manic attack in these cases is much less deeply seated than in dementia præcox and allied conditions; the conflict is much more clearly realized by the patient, the flight into the psychosis coincides with the relaxation of efforts which are recognized as inadequate to deal with the actual situation, the cessation of the struggle permits the frank expression of repressed elements. . . . It is important to study closely the content of the utterances of the manic patient in order to understand the meaning of the situation leading to the attack; this line of investigation includes an accurate estimate of the equilibrium of forces which make up the patient's personality, and involves a thorough study of the individual's development. A thorough review of the above factors may put the patient in a better position with regard to the possibility of avoiding further attacks."

Aconite useful in melancholia if blood pressure is high (*see p. 1*).

Post-febrile Insanity.—Under this heading Goodall¹³ places the mental disturbances which arise in connection with acute specific fevers. He quotes Friedländer as stating that about 2 per cent of typhoid cases develop mental symptoms more lasting than transient delirium. They are reported also to occur not infrequently after erysipelas. Puerperal insanity, moreover, may in the great majority of cases be included in the same group. Goodall points out that the clinical features are extremely diverse; almost any form of mental disorder may arise from infection, acute confusional states, stupor, maniacal excitement, depression, and even conditions closely resembling dementia paralytica and Korsakow's psychosis. In short, if we exclude systematized delusional insanity, they include "practically all the forms in which disease of the mind manifests itself. The specific fevers can reproduce them all, so that differential diagnosis from like mental disorders as ordinarily seen for the time being is practically impossible. . . . The above considerations prompt the inquiry as to whether the forms of insanity we are accustomed to meet with of unknown origin are due also to toxins exogenous or endogenous." Another noteworthy point is that "one and the same provocative disease (toxin) produces different forms of insanity in different persons, which is presumably due to individual peculiarities. . . . The abnormal constituents of the brain in individuals falling victims to mental disorder would seem of more importance than the exciting causes: the *irritabile* more than the *irritans*."

Puerperal Insanity.—In reviewing the etiological factors concerned in the production of puerperal insanity, McCarthy¹⁴ considers heredity to be of great importance. Of 519 cases reported, 182 exhibited hereditary indications of insanity (about 35 per cent), and this probably was below the mark. The frequency with which insanity follows labour appears to vary greatly. Reid and Macleod, who together report on about 20,000 labours, found that puerperal insanity occurred once in 397 cases; Rigden once in 2000. It has frequently been remarked that puerperal insanity is less common in recent years.

This is corroborated by the number of admissions to the Philadelphia Hospital for the Insane, the average for the five years 1905-9 being 17.4 annually, and of 1910-14 only 8.4. This marked reduction in frequency is attributed to a better practice of obstetrics and better care of the pregnant woman. There is, however, some difficulty in reconciling this improvement with the statement made earlier that hereditary factors are of the first importance, as it is not likely that there has been much change recently in inherited tendencies of the population.

Syphilis.—Vedder and Hough¹⁵ investigated the prevalence of syphilis in an asylum population without reference to the nature of the mental disorder. The technique used was that recommended by Landsteiner, Müller, and Potzl. The cases investigated were 616 consecutive admissions in the State Hospital for the Insane, Washington, D.C., in which are received all soldiers, sailors, and federal prisoners who become insane. The following points were brought out: There was no syphilis in 83 white females, but of 65 coloured females the percentage was 12.3 per cent. In 374 white males the percentage was 19.5 per cent, and in 93 coloured males it was 23.6 per cent. The total percentage in all cases is 16.7. It was estimated that in 10 per cent of these cases the insanity could be directly attributed to the syphilis. A further series of 437 cases were taken at random from several parts of the institution, all of whom were white males, and were investigated by Vedder, using a technique described by Craig. He found 16.4 per cent were syphilitic. The authors consider that these results are distinctly too conservative, and state that from 20 to 30 per cent of the white males in this institution were syphilitic. Other authorities are quoted:—Ivey (Alabama): In negroes, 25 per cent males, 29 per cent females; Matson (Oregon): 20 per cent; Mitchell (Warren State Hospital): out of 1671 cases, 14.7 per cent. Vedder and Borden, investigating 744 inmates of a soldiers' home, state that 20.8 per cent gave a positive Wassermann reaction, whilst using on the same men both the Wassermann and the luetin test, 45 per cent of syphilitics were detected.

In idiocy and imbecility, Goodall and Schölberg¹⁶ did not obtain the high percentage of positive results that other observers have reported, finding only 6 per cent of positive Wassermann reactions in epileptic cases, and 3 per cent without epilepsy. It should be noted that only 46 cases were reported on. They quote other authorities, viz., Dean, 330 cases, 15 per cent positive; Kreber, 262 cases, 21 per cent positive; Fraser and Watson, 204 cases, 46 per cent positive.

In a series of 21 Mongolian idiots, Stevens¹⁷ obtained positive results in the blood-serum in 10 per cent, and 25 per cent in the cerebrospinal fluid. In the same cases the globulin content was increased in 90 per cent of the cases.

In 257 young feeble-minded cases in the Stoke Park Colony,

quoted by Mott,¹⁸ the reaction was positive in 8.1 per cent, and in 52 inmates of a Borstal institution 7.7 per cent.

In epilepsy, in 418 adults the positive results were 7.4 per cent.

Referring to the general population in Cane Hill, of 284 consecutive admissions, 31 per cent were positive; in 692 male patients (excluding general paralysis), 8.3 per cent; and of 259 female cases, 8.5 per cent. This must be compared with 500 non-asylum cases apparently healthy, with 9.2 per cent; but of these, of 365 who had never been in the army or navy, only 6 per cent were positive, whilst of 127 who had been in the army or navy 18.89 per cent were positive. Lastly, of 1483 admissions into poor-law institutions, the percentage of positive results was 18.9 per cent.

In considering the serious problems raised by these figures, it is first necessary to be quite sure that a positive Wassermann reaction may be taken as a certain indication of syphilis, latent or manifest. It is well known that malaria and some other diseases give a positive reaction, and in spite of the prevailing opinion that there are few fallacies if the test is carried out by competent men, the thought arises that possibly there are other disturbing factors which have not yet been discovered. The results quoted are extremely disquieting, and suggest that there is abroad a very large amount of unrecognized syphilis. It would seem that this disease is much more hurtful than has been hitherto realized, and its influence more widespread and lasting. Yet it appears to be too early to look upon the matter as settled, and it must be remembered that the test is complicated and the biochemical changes concerned are very imperfectly understood. For the present it would seem desirable to keep an open mind and await further investigation.

Abderhalden Test.—Goodall¹⁹ refers to the value of Abderhalden tests as applied to psychiatry, and thinks that there is considerable evidence that they will be of value in distinguishing organic from the 'functional' and 'constitutional' psychoses. In the latter (i.e., in manic-depressive and confusional insanity, paranoia) no specific ferments are present, whilst in dementia præcox and in general paralysis these are found. He also referred to the antitryptic substances found in increased amounts in the blood-serum of patients suffering from dementia præcox and dementia paralytica, as compared with the sera of patients with functional disorders. So far the evidence points towards the presence in the serum of breaking-down products derived from the cortex of the brain in both general paralysis and dementia præcox, whilst in the latter disease the genital glands, and possibly the thyroid also, yield products of cell-degeneration.

Further researches as to the value of the Abderhalden tests in dementia præcox by Schwarz, of Berlin, and Rosental and Hilfort, of Heidelberg,²⁰ were inconclusive and the results conflicting. It would appear that the technique is not sufficiently understood, and there were divergent results with the same organ obtained from different sources. Sometimes a double experiment gave contradictory results.

It would thus appear that at the present time there are no sound grounds for drawing diagnostic conclusions from the serological results of the Abderhalden method.

Insanity and the War.—It is too soon to express any decided opinion upon the many psychological problems that have arisen directly or indirectly from the War. Comparatively little has been published, though an immense amount of experience has been gained respecting traumatic insanity and the development of psychoneurosis by shock. It will be some time before conclusions emerge from the mass of detail, and, moreover, those best able to form opinions are too fully occupied to publish them.

The strain of shell-fire and of bombs has undoubtedly caused much mental trouble. It has been stated that the strongest and most stable have frequently suffered most during the bombardment of our towns. Yet it is generally recognized that there has been very much less insanity than might have been expected, and the number of cases directly attributable to the war have been surprisingly few, compared with the widespread anxiety and terrible distress from bereavement that exists. Even when the stress of events seems to be directly responsible, constitutional factors are probably equally important. Thus, an unhappy woman, who had lost her husband in the *Lusitania*, is suffering from melancholia; but on inquiry it was ascertained that many years previously she had had a previous attack of depression.

The mental symptoms produced by concussion, or the direct effect of shell-fire when there is no indication of any bodily injury, are extraordinarily varied and seem altogether inexplicable. Temporary blindness, mutism, acute mental confusion, amnesia of all kinds, delusional states, even the Korsakow syndrome, are reported, as well as neurasthenic and hysterical symptoms in great variety. Mania depending upon terrifying hallucinations also occurs, as do many other neurotic symptoms.

Consequently, the mental symptoms produced by trench warfare are even more protean than those due to alcohol or the poison of general paralysis. Shock symptoms, however, tend towards spontaneous recovery, and sometimes recovery occurs with dramatic suddenness. There is reason to think that the mental make-up of the individual determines to a considerable extent the nature of the psychosis, so that the mental trouble is really dependent upon pre-existing tendencies. Thus in some cases the shock itself appears to have little etiological significance. No doubt the shock is considered by the patient and friends of prime importance and its rôle exaggerated, just as a fall in infancy is frequently said to be the cause of epilepsy. The evidence, however, points strongly towards the view that the innate and personal factor contributes fully as much to the production of the symptoms as the shock or injury. It is reasonable to expect that the experience gained in the special military hospitals will enable us to understand more clearly than at present the respec-

tive parts played by physical and psychical factors, and direct us towards the best lines of treatment. At present there is no general consensus of opinion. Suggestion and hypnotism have been employed with great success, so also analytical investigation; on the other hand, some advocate ordinary hygienic treatment in preference to an attack on the psychological side.

It is very satisfactory to note that in the military hospitals chiefly devoted to mental disorders, the medical staff is relatively very strong, and a large amount of patient research is being undertaken. No one will grudge the care and attention paid to soldiers knocked out in the service of their country, even though, in many respects, the treatment is more thorough and is conducted under more satisfactory conditions than can be secured by the community generally.

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1913, i, 1933, and *Med. Rec.* 1915, i, 253; ²*Jour. Amer. Med. Assoc.* 1912, 1499; ³*N. Y. Med. Jour.* 1914, ii, 962; ⁴*Jour. Amer. Med. Assoc.* 1914, i, 193; ⁵*Boston Med. and Surg. Jour.* 1915, ii, 268; ⁶*Jour. Ment. Sci.* 1915, 424; ⁷*Boston Med. and Surg. Jour.* 1913, ii, 934; ⁸*Lancet*, 1914, ii, 1296; ⁹*Ibid.*; ¹⁰*Jour. Ment. Sci.* 1911, also *Lancet*, 1914, ii, 1346; ¹¹*Lancet*, 1914, ii, 1351; ¹²*Rev. Neurol. and Psychiatry*, 1914, 175; ¹³*Lancet*, 1914, ii; ¹⁴*Amer. Jour. Obst.* 1915, 269; ¹⁵*Jour. Amer. Med. Assoc.* 1915, ii, 972; ¹⁶*Lancet*, 1915, ii, 1457; ¹⁷*Jour. Amer. Med. Assoc.* 1915, i; ¹⁸Mott, *L.C.C. Report*, quoted in *Jour. Ment. Sci.* 1915, April; ¹⁹*Lancet*, 1914, Dec. 19; ²⁰Quoted in *Rev. Neurol. and Psychiatry*, 1915, 47.

MESENTERIC GLANDS, INFLAMMATION OF.

E. Wyllys Andrews, M.D., F.A.C.S. (Chicago).

Gage¹ reports a case with all the symptoms of acute appendicitis: sudden onset, pain, rigidity, high leucocyte count, and so forth, which upon operation was found to be inflammation of the ileocolic glands only. The writer also calls attention to the fact that these glands participate in appendicular inflammation, and have sometimes to be removed, as reported by the late Maurice Richardson in 1900. Similar reports have been made by Elliott (1899), and later by Marchand. McCosh also reported cases of inflamed mesenteric glands simulating typhoid perforation. These had ruptured into the free peritoneum during the progress of the typhoid. Most of the ileo-cæcal nodes so far reported were collected by Parker. Hess, in discussing cases of this type, found that 62 per cent of all those reported had the bovine type of bacillus. He thinks that the lymphoid follicles of the intestine formed the port of entry.

REFERENCE.—¹*Bost. Med. and Surg. Jour.* 1915, ii, 301.

MIGRAINE.

J. Ramsay Hunt, M.D.

In the vast majority of cases, a tendency to migraine entails no more serious consequences than the recurrence of periodical headaches of varying degrees of severity. Headaches of this character are often associated with curious transitory focal symptoms, e.g., scotoma, hemianopsia, hemiparesis, and hemiparæsthesia. More rarely, evanescent aphasic attacks and mental disturbances accompany the seizure. These focal manifestations are purely functional in

nature, and disappear promptly with the subsidence of the other symptoms of the paroxysm. They are generally regarded as manifestations of vascular spasm, and this theory is in harmony with their temporary and evanescent nature. Attacks of this character may recur over a period of many years and yet leave no permanent mark or symptom. Unfortunately, this is not always true, and in rare cases permanent and often serious consequences ensue.

The paralytic and other permanent complications of migraine may appear in various forms, viz., as ocular palsies (migraine ophthalmoplégique), organic hemiplegia with aphasia, hemianopsia, and optic atrophy. A recurrent facial paralysis has also been ascribed to migraine (facioplegic migraine), presumably of the same nature and having the same pathogenesis as the ophthalmoplegic type of this affection. Ramsay Hunt¹ records his personal experience with this comparatively rare group of cases, and emphasizes the clinical fact that migraine, which is usually so harmless, may on occasion be the cause of serious and permanent sequelæ. Among the paralytic and other persistent sequelæ may be mentioned ophthalmoplegia, hemiplegia and aphasia, hemianopsia and lesions of the optic nerve (atrophy and retrobulbar neuritis).

In the recognition of migraine paralysis, the essential points to be considered are: (1) The establishment of a definite clinical history of genuine or idiopathic migraine; and (2) The direct relationship of the paralysis or other complication to the migraine paroxysm. As many attacks of hemicrania begin during the day, terminating in a heavy sleep, the presence of paralysis in the morning on awakening would be strong presumptive evidence of an etiological relationship to migraine. Special emphasis should also be placed upon the presence of what may be termed 'warning symptoms,' i.e., the recurrence of transient ptosis, diplopia, hemianopsia, hemiparesis, aphasia, and Jacksonian seizures, when such symptoms appear in middle life after a migraine paroxysm. Especially significant are such symptoms when they are foreign to the usual attack.

Hunt states that he is not aware of any permanent sequelæ, after an attack of migraine, which could be traced to occlusion of the vessels of the pons, medulla, or cerebellum. This is rather curious and difficult of explanation, considering the rich blood-supply in this region and its frequent involvement from other causes. Two other groups of cases should be considered from the standpoint of permanent vascular lesions, namely, the epilepsy which is so often associated with migraine, and vertigo permanens. Both of these conditions are usually regarded as merely functional substitutions or alternations of the neurosis itself, in other words, as a kind of migraine equivalent; the possibility of a permanent vascular focus resulting from an attack of migraine must be considered as a possible etiological factor in the presence of either epilepsy or persistent vertigo.

REFERENCE.—¹*Amer. Jour. Med. Sci.* 1915, ii, 313.

MIKULICZ'S DISEASE. (*Vol.* 1915, *p.* 395.)

MORPHINE INJECTOR'S SEPTICÆMIA (Whitmore's Disease).

Sir Leonard Rogers, M.D., F.R.C.P.

H. G. Knapp¹ points out that this disease, which was first described by Whitmore in Rangoon in 1912, is likely to be found in other towns in the tropics. It is an obscure condition which generally is only recognized in the post-mortem room. He recently saw a case in the Rangoon gaol. with irregular pyrexia, which was diagnosed as chronic tuberculous pleurisy, but after death the lungs showed firm yellow areas with a zone of congestion round them, from which Owens cultivated a motile bacillus similar to that described by Whitmore, differing from the *B. mallei*, although the disease more closely resembles chronic glanders than any other.

REFERENCE.—¹*Ind. Med. Gaz.* 1915, 287.

MORPHŒA GUTTATA.

E. Graham Little, M.D., F.R.C.P.

Bunch¹ adds another to the small list of cases of this dermatosis. It is probable that at least some of the instances of what has been called, chiefly by American writers, 'white spot disease,' are really referable to this group, for which morphœa is certainly a more convenient term. The case described by Bunch was that of a girl, age 11, showing about a dozen characteristic lesions. These in the final stages were dead-white porcelain-like nummular patches, which seemed sunken under the surface of the skin, in earlier stages with a pinkish areola, which was lost later. They varied in size from that of a threepenny-bit to an area $1\frac{1}{4}$ in. by 1 in. The appearance of individual patches was preceded by itching in the site, this symptom ceasing when the patch matured. None of the areas showed any signs of involution. The distribution seems to have been chiefly on the trunk, was asymmetrical, and fresh crops of lesions made their appearance during the three months she had been under observation, the eruption having begun to show two months previously. There was no sign of any eruption of lichen planus, and no family history of tuberculosis. Histological data support the identification of these curious cases with sclerodermia, and the treatment is as unsatisfactory as in that disease.

REFERENCE.—¹*Brit. Jour. Derm.* 1915, 77.

MOUNTAIN SICKNESS. (Vol. 1915, p. 397.)**MUMPS. (Vol. 1915, p. 298.)****MYALGIA, ABDOMINAL.**

Herbert French, M.D., F.R.C.P.

Hanan¹ draws attention to the occurrence of acute myalgia of the abdominal muscles, a condition to be differentiated carefully from surgical lesions. He is firmly convinced "that myalgias of the abdominal muscles without underlying visceral inflammations do occur, and much more frequently than is supposed, and it is high time that the abdominal wall shouldered some of the blame for many an innocent appendix needlessly cut off." He gives the clinical histories of six illustrative cases, in most of which the pains were of acute onset, some-

times after exposure to cold or damp, and with the abdominal pains there was usually considerable rise of pulse-rate and of temperature, the pyrexia being of short duration, but simulating a septic remittent type, such as that met with in infective fibrositis or infective peri-arthritis. He lays stress on two points in diagnosing myalgia of the abdominal muscles from serious disease of the underlying viscera. First, a sharp tap upon the muscles themselves, or more particularly their tendinous attachments, excites pain promptly, while gradual deep pressure often offers a mild discomfort in comparison; this is highly significant, because an intra-abdominal lesion usually gives more pain, the deeper and firmer the pressure. Secondly, rectus abdominis muscle pain may be demonstrated readily by placing both thumbs on the outer border of one muscle, the remaining fingers on the outer border of the other, and then pressing them together. The chief importance in recognizing such a condition is in avoiding unnecessary laparotomy.

REFERENCE.—¹*Amer. Jour. Surg.* 1914, ii, 355.

MYCETOMA PEDIS.

E. Graham Little, M.D., F.R.C.P.

This disease, common enough in the tropics, is seldom seen in this country, and the following case described by Semon occurred in a Sikh, a member of the Indian Expeditionary Force, invalided to England from Flanders. The disease had been acquired in India, but the condition of swelling and septic discharge had apparently dated from an injury to the foot caused by a heavy weight falling on it in January, 1915, three months after his departure from India. When seen, in May, there was an extensive area of darkened skin over the dorsal and tibial aspects of the swollen right foot, situated in which were soft protuberant masses of dusky purple granulations. These exuded clear fluid and sometimes pus, which there was subsequent evidence for believing came from sinuses extending down to and involving the tarsus, metatarsus, and tendon-sheaths. In the discharge there were almost invariably present the minute black granules which are seen on examination with a $\frac{1}{8}$ objective to consist of masses of mycelium obscured by black pigment. This fungus grew best on agar-agar, maltose agar, and on Raulin's liquid medium, at a temperature of 35°, a copious culture being obtainable within ten days. Histological examination proved the growth to be a typical granuloma, with polymorphonuclear plasma cells and young connective-tissue cells.

Injections with the filtrate of cultures were tried, both boiled and unboiled, without producing any reaction. Administration of **Iodide of Potassium** was followed by a pronounced reaction, both local and general, and in view of this result its administration would be continued. The patient refused amputation, which was the best method of treatment, for without it cases usually succumb after some years to septic infection,

REFERENCE.—¹*Brit. Jour. Derm.* 1915, 240 and 299.

MYCOSES FUNGOIDES.*E. Graham Little, M.D., F.R.C.P.*

Knowles¹ contributes a very careful histological study, beautifully illustrated with microphotographs of sections from seven cases of mycosis fungoides. He remarks that the apparent diversity of the histological picture presented by different writers on the subject is explained by the different lesions and stages at which examinations have been made. The disease apparently starts with a dilatation of the sub-papillary blood-vessels, and a perivascular cellular infiltration, which soon spreads upwards into the papillæ and laterally in the upper zone of the corium. The collagen and elastic tissue are normal. There is no change in the epidermis, with the exception of slight intercellular œdema. In later stages the infiltration surrounds the sweat-coils and hair-follicles, and spreads into the subpapillary zone and deeper parts of the corium, which in the latest tumour stage may be infiltrated throughout, whereas previously the infiltration stopped at the mid-zone, or above it. In later stages the œdema of the epidermic cells increases and combined with increased proliferation of these cells, causes an enormous prolongation of the interpapillary processes. Very numerous mitoses are observable in all parts of the prickle-cell layer, and especially the lower and basal portions. Vesicle formation is also observable, just beneath the horny layer. The lymph-spaces become enlarged. The endothelial coat of the blood-vessels is thickened.

TREATMENT.—In a debate on the subject referred to in last year's MEDICAL ANNUAL, one of the questions set for discussion was the rôle of X-Ray treatment, which practically offers the solitary hope of any amelioration in that disease, and Galloway voiced a general opinion in the following summing up: "Considerable doubts evidently remain as to the possibility of cure by means of x rays. There was no doubt that cases had recurred after the use of x rays. Possibly the safest line in x -ray treatment was to confine it to the destruction of the actual tumours as they appeared." Graham Little² reports a very extraordinary example of an explosively sudden development of the tumour stage in a case of mycosis fungoides which was seen in the so-called pre-mycotic stage, and very excusably mistaken by the practitioner in charge for psoriasis, and treated with several exposures of x rays. The immediate result appeared to bring on an extensive eruption of fungating tumours, which did not yield to further doses of x rays. Mycosis fungoides therefore remains one of the most intractable and formidable of skin diseases.

REFERENCES.—¹*Jour. Cutan. Dis.* 1915, 563; ²*Brit. Jour. Derm.* 1915, 280.

MYELOMATA, MULTIPLE.*Herbert French, M.D., F.R.C.P.*

Full notes of four cases of multiple myeloma are recorded by Kahn,¹ who emphasizes the point that Bence-Jones's albumosuria, though striking and nearly diagnostic when it does occur, is by no means a constant phenomenon of this disease. It was present in only two of his four cases. (*See also* LEUKÆMIA.)

REFERENCE.—¹*Med. Rec.* 1914, i, 843.

MYOPIA. (*Vol.* 1915, *p.* 400.)**MYOSITIS, TRAUMATIC.***W. I. de C. Wheeler, F.R.C.I.*

Localized *myositis ossificans* can be dealt with successfully by excision, but Robert Jones has found the myositis of the brachialis anticus muscle following injury to the elbow-joint very intractable and difficult to deal with.

Oliver¹ points out that the occurrence of true bone in muscle has always held something of a mystery. Nearly all cases occur in the brachialis anticus or quadriceps extensor, rarely in other muscles. "The essential character of the process is the formation of typical spongy bone intimately incorporated in the muscle. At an early stage it is cartilaginous, varying greatly in extent and shape. In the arm it may involve the origin, middle, or entire brachialis anticus muscle, and often the peri-articular structures. The most typical growth is a somewhat tapering piece of bone in the brachialis anticus attached by a narrow stem to the tip of the coronoid process of the ulna; but as a rule the new bone is not firmly attached to the humerus or ulna. In the thigh the formation is, as a rule, attached to the femur, and has to be chiselled off. All cases are said to have attachment to the bone at some time during development, in the nature of a small pedicle, the remainder of the shaft having a smooth outline. The mass may be rounded, elongated, with irregular tongue-like projections, fan-like, or coral-like. At times there is a shell of bone containing old blood-clot, and in other cases cysts with bony walls. Following a severe trauma to the anterior surface of the arm or thigh, there are pain, marked swelling and discoloration, and complete disability for a few days. A röntgenogram at this time shows no fracture. Usually, after a few days' rest, the patient resorts to massage and motion, and in ten to fourteen days an increasing stiffness and disability is noted. A firm lump may then be felt at the seat of injury, without the usual signs of inflammatory reaction. The lump continues to increase in size, and in three to four weeks the disability becomes complete. Examination shows a firm mass in the muscle, usually somewhat movable on the bone. Röntgenoscopy reveals a distinct shadow in the muscle, attached at one part, as a rule, to the shaft of the bone. During the next three or four months the mass remains stationary in size, slowly becoming harder. A gradual decrease then ensues, but the growth, as a rule, persists for several years. Usually the restoration of function is complete, or nearly so, after four months. The only complication noted has been the limitation of motion—never any disturbance from pressure on nerves or blood-vessels."

J. B. Murphy in his surgical clinics draws constant attention to the liability of the muscles of the forearm to *ischemic myositis* following the application of bandages, plaster, and splints, and urges the immediate removal of dressings if the patient is suffering much pain. Neglect of this precaution is responsible for many of the cases of Volkmann's contracture. In an exhaustive paper,² Murphy states

that very rarely does the condition follow an injury or fracture in which no bandage was used. This occurred in one case seen by him, in which a contracture of the flexor tendons of the arm followed a trauma, a street-car running over the patient's forearm. It is the only case of the kind he has seen. The muscles of the arm, e.g. the biceps, can have a similar contraction. The condition is most often met with consequent on fractures at the elbow-joint or in the forearm, but it does occur in the lower extremity as well as in the upper. Certain it is that a severe contusion of the muscles of an extremity, without fracture or external wound or evidence of injury, may be followed by this contracture.

Cases are also recorded in the literature in which a tight plaster-of-Paris cast has caused "an immediate paralysis of the muscles" and a subsequent contracture. In his cases it was fairly clear that hæmorrhage beneath the aponeurosis of the upper forearm following fracture or injuries of the deeper structures, can cause myositis and subsequent contraction, even when splints or bandages have not been used. These are the internal compression variety. The splint causes the external variety.

The symptom-complex in a typical case—say following a supra-condyloid fracture of the humerus—is described as follows:—

"There is first the injury of the joint and the surrounding tissues, causing an infiltration of the tissues, and a compression of the vein which results in a venous stasis. Second, the local infiltration in the upper forearm, severe in degree, causing a woody hardness, bronze glistening skin, and severe pain, the result of the venous stasis in the subcutical tissues. Third, degeneration and atrophy of the muscle cells and cicatricial formation. Fourth, contraction of the muscle scar and tendons, leading to a deformity of the hand and fingers. Fifth, electrical changes in the muscles, if much muscle tissue is destroyed or when the nerve-supply is injured in the manner stated above. The paresthesias, anæsthesias, and hyperæsthesias are accounted for by the associated nerve lesions. There may also be some constitutional disturbance, such as elevation of temperature, some malaise, or sensations of chilliness; but as a rule these are absent or so completely overshadowed by the pain that no notice is taken of their existence. In a few cases the interossei and lumbricales are also involved; that is, there may be a slight atrophy. The most characteristic and at the same time early severe symptoms are the pain and the swelling. The other symptoms are in the nature of associated symptoms, but should be looked for in making the diagnosis."

"As to the late diagnosis of this condition: The deformity of the hands and fingers is in itself diagnostic. It is the typical claw-finger, *main-en-griffe*. The fingers are flexed into the palm of the hand when the wrist is extended or partially extended, and even with the use of considerable force the fingers cannot be straightened. The metacarpophalangeal joints are not flexed. When the wrist is flexed,

the fingers can be extended wholly or partially, except in the very severe cases, when the interphalangeal joints remain more or less flexed. As the condition progresses, the wrist-joint may likewise be flexed and the finger-nails are forced into the palm. The forearm is slightly pronated and the elbow becomes somewhat flexed. The condition is then accompanied by wasting of the flexor muscles, and it may reach so great a degree that the muscles are no longer palpable; but in the place of muscles one feels a hard rope-like mass. Except for the flexion of the joints, they are normal; that is, their anatomic structure remains unchanged. On the anterior surface of the wrist-joint it is always possible to see or at least palpate the tense tendons of the flexor muscles. They feel like a bundle of large violin strings, and they are made more tense or more prominent on every effort to extend the fingers.

"In arriving at a late diagnosis it is well to consider the following if one would avoid falling into error: (1) The history of a fracture, trauma, or infiltration of the tissues, accompanied by pain; (2) swelling of the hand and forearm, cyanosis, and severe pain in the forearm, hand, and fingers; (3) Amelioration of the symptoms on the removal of a constricting bandage or compressing splint, or on straightening out the flexed forearm; or (4) The infiltration continues to increase in degree in spite of the removal of the bandage; (5) In complicated cases the presence of anæsthesia or paræsthesia; (6) In complicated cases the absence of the radial pulse (this is rare); (7) They show no improvement with time, but, on the contrary, become worse, and are not materially benefited by massage or electricity."

TREATMENT.—"Prophylactic treatment consists in (1) Avoiding the immediate application of compressing splints or circular constricting bandages or casts. (2) Permitting the forearm to assume the position of greatest comfort for twenty-four or forty-eight hours, unless there is a backward dislocation of the elbow, which should be corrected. (3) *The elbow should never be fixed in a flexed position* immediately after the accident. (4) If the cyanosis still continues with the forearm extended and elevated, the fascia on the antero-ulnar side of the forearm should be split for a distance of three to six inches subcutaneously. This can be done with a tenotome without any danger of compounding the injury, and should be done within twenty four to thirty-six hours, if good results are to obtain. (If the forearm is dissected, one can see the firm capsule surrounding the flexor group of forearm muscles in its upper six inches). (5) Put on the fixing bandage later, when the swelling has materially subsided. (6) The displacement of the fragments can be restored six to ten days after the fracture just as well as on the day of the fracture, and with much less hazard to the extremity."

Bandages and splints *should never be applied for the purpose of reducing a fracture*, and rarely even for the maintenance of position by force after reduction. They are simply immobilizers or means

for limiting voluntary or mechanical disturbance of the bones after reduction is effected. In the last five years Murphy has seen upwards of fifty cases of this type, involving the upper extremity. In not one of these was there any paralysis of sensation or motion, showing that the nerve was functioning properly.

After a description of non-operative treatment and a mention of the dangers of Mikulicz's method of shortening the bones of the forearm (an operation reserved for very bad cases), Murphy strongly advocates treatment by lengthening of the flexor tendons.

"The principles of treatment consist in (1) The correction of the deformity by tendon elongation, not mere division. (2) Balancing the muscle groups, so that subsequent contraction and deformity do not occur. (3) The transverse division of such portion of the joint capsule and forearm fascia as is necessary to permit of a full latitude of motion in the joint at the time of operation. The first is accomplished by the elongation of the flexor tendons by means of a shaped incision and division of the tendon. Each tendon should be elongated sufficiently, so as to leave a good slack at the time of the primary correction. If possible, adjacent tendons should not be divided on the same plane. To avoid uniting wrong ends of tendons to one another, a sort of crossing of the wires, the sutures should be inserted in the ends of each divided tendon immediately after the division—not tied, but clamped with a forceps and laid aside. The degree of elongation should be estimated by straightening the fingers and extending the wrist to the fullest extent after division and before approximation. This lengthening may need to be made for as great a distance as three inches, but the degree of lengthening does not in any way increase the difficulty of the operation or militate against the final good result. When the tendons have all been elongated and sutured with a very fine chromicized gut or silk, if the hand still does not come into a fully extended position, the capsule of the joint should be divided across the anterior surface of the wrist-joint. The line of tendon division is covered by a pedicled flap of fat and fascia taken from the side of the wrist. When this cannot be accomplished, the point of union or approximation should be surrounded by egg membrane to prevent tendon agglutination, or a free fat flap should be transplanted into the space. When the sutures are tied and the tendons replaced, a portion of the tendon sheaths or the fascia and fat from the inner or outer side of the forearm should be swung in between the tendon groups and sutured, so that each tendon will lie in its separate compartment. Unless this is done, the tendons will become fixed to each other transversely, and the muscles will move as a group in place of individually. This tendon elongation is ideal in its results if one attains asepsis and has some muscle cells remaining to contract when the tendon is elongated."

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1914, ii, 1452; ²*Ibid.* 1249.

MYXEDEMA. (See THYROID INSUFFICIENCY.)

NASAL ACCESSORY SINUSES.*J. S. Fraser, M.B., F.R.C.S.*

Brown Kelly¹ states that *exploratory puncture* is the most reliable method of diagnosing antral suppuration, and is, therefore, in daily use. It is generally regarded as simple and safe, but disquieting experiences are by no means uncommon. As a rule the antrum is perforated from the nose beneath the inferior turbinal by means of a Lichtwitz trocar and cannula. Kelly enumerates the following difficulties: (1) In children under twelve years, puncture may be unsuccessful because the floor of the antrum is still high. In these cases the middle meatal route should be adopted. (2) In patients with the narrow type of face, the puncture must be made further back than usual in the inferior meatus, for otherwise one may bore in front of the antrum and so enter the tissues of the cheek and give rise to cellulitis. Under such conditions it is possible to injure the lower end of the nasal duct. (3) Ozæna cases have a thick naso-antral wall or a small antrum. X-ray examination of adults with ozæna shows defective development of these cavities.

After the antrum is entered and the trocar withdrawn, pus, if present under pressure, may drop from the cannula. Aspiration may first be tried, but is usually omitted. Kelly has been in the habit of blowing air through the antrum in order to force the pus out into the middle meatus. The following conditions may prevent perfilation of the antrum: (1) The ostium may be blocked. In such circumstances a second cannula should be inserted alongside the first to serve as a counter-opening. (2) A polypus may occlude the ostium—usually in an intermittent manner. The valve-like action of the polypus may sometimes be avoided by changing the position of the patient's head. (3) When the antral lining membrane is swollen, the point of the cannula may be embedded in the œdematous tissue. (4) A dental cyst, or (5) A cyst of the antral lining membrane may almost fill the cavity of the antrum. (6) Caseous pus and very tough mucus may offer resistance. Forcible perfilation has its dangers. The tendency is to blow strongly enough to force a passage by the ostium. Kelly earnestly warns against any such attempt.

Of many hundreds of patients operated on by Kelly, about a dozen have presented symptoms which are to be ascribed to the procedure (proof puncture). Kelly reports a second fatal case, this time following perfilation of the frontal sinus.

From an examination of the literature, Kelly concludes that a trocar may infect the subperiosteal tissue of the antrum and give rise to abscess, pyæmia, and metastasis. The trocar may enter the orbit, and emphysema or abscess may result. The trocar may also traverse the antrum and pierce its posterior wall, and so enter the pterygoid plexus of veins. In this way air may be blown into the internal and external jugular veins. Washing pus out of the antrum may cause fever and rigor, or may produce disturbance of vision. Hystero-epilepsy and hysterical mutism have also been produced.

Symptoms of shock are not infrequent, and by some are attributed to the use of cocaine. More rarely cyanosis and dyspnoea, with convulsive movements of the limbs, follow perforation of the antrum. Paralysis and loss of consciousness have sometimes been observed. With regard to the causes assigned for these accidents, the effect of local anæsthesia has already been mentioned. Air embolus is probably a much more important factor. In Bowen's case the mucous membrane was detached from the bony wall of the antrum, and air was present in the pulmonary artery. The grave symptoms which result from exploratory puncture of the antrum are strikingly similar to those which occasionally arise during the production of artificial pneumothorax. Spasm of the cerebral arteries and reflex irritation of the vagus have also been suggested as causes.

In the discussion which followed the reading of this paper, the abstractor stated that in the Edinburgh Infirmary the antrum was punctured according to the method described by Kelly, except that air was not blown through the cannula. In its place sterile, lukewarm normal saline solution was injected. During the last ten years, although the speaker had occasionally seen minor accidents, such as swelling of the cheek, he had never observed any of the serious conditions mentioned by Kelly. He thought that this immunity was due to the fact that in Edinburgh they did not inflate with air after puncture of the antrum.

X-ray methods of examination are described on page 53.

Operations on the Maxillary Antrum.—Marquis² points out the advantages connected with the operation devised by Denker for chronic suppuration in the maxillary antrum. (1) The simplest operation, however, is that of Krause, which consists in amputating the anterior third of the inferior turbinal and making a large opening from the inferior meatus into the antrum, thus permitting thorough washing out of the sinus. (2) Skillern makes a vertical incision in the nose anterior to the inferior turbinate, and excises an ellipse of mucous membrane. He then frees the mucosa from the nasal wall, and the periosteum from the anterior surface of the superior maxilla. He next removes the bony ridge of the pyriform aperture, and enlarges the opening until he has free access to the antrum. He then removes the lateral wall in the same manner. In cases, however, in which the mucous membrane of the antrum has undergone polypoid degeneration, the mere establishment of drainage will not suffice. The polypoid mucosa must be thoroughly cleaned out. (3) For this purpose the Caldwell-Luc operation is most usually performed. Marquis holds that it is more difficult than (4) the Denker operation. The latter does not necessitate the removal of the anterior end of the inferior turbinal, which, according to Marquis, is a weak point in the Caldwell-Luc operation. Denker makes the incision through the mouth, and attacks the anterior angle of the antrum by removing the wall of the pyriform aperture. The only disadvantage of Denker's operation is the cutting of the fila-

ments of the anterior dental nerve which go to the canine and incisor teeth, with consequent loss of sensation. One might have expected that injury of the tear-duct would be frequent, but only three cases are recorded up to date.

Frontal Sinus.—Lothrop³ records eighteen cases which have been operated upon according to the following technique. As a preliminary, the anterior end of the middle turbinal is removed and some of the neighbouring ethmoidal cells are opened, in the hope that this may effect a cure. X-ray examination is also carried out, both lateral and antero-posterior views being taken. Ether is administered, and the patient placed in a position half-way between sitting and supine. Just before etherization a pledget of cotton-wool, with epinephrin (1-2000) and cocaine (4 per cent), should be placed in each anterior ethmoidal region. Posterior nasal plugs are also inserted. The eyebrow should not be shaved. A single curved incision, one inch long, is made in the inner portion of the eyebrow, limited externally by the supra-orbital notch, in order to avoid injuring the nerve. The bone over the lower anterior angle of the frontal sinus is then bared of periosteum, and the sinus is entered with the chisel and the gap enlarged by rongeur forceps, so as to make an oval opening about three-quarters of an inch long. Pus, granulations, and polypi are gently removed, and then a curved probe is passed through the ostium into the nose and left *in situ* as a guide. Curved curettes are then passed down from above just in front of the probe, and the walls of the cells on the floor of the sinus are broken up. The operation is completed by means of Tilley's burrs and by Lothrop's rasps. The bone removed includes the nasal crest and spine of the frontal bone, the thick ends of the nasal bones, and the nasal process of the superior maxillæ. The interfrontal septum should be perforated and then burred away, so that the other sinus may be explored. Then, by means of the burr, the anterior part of the perpendicular plate of the ethmoid should be removed. Through this same opening in the anterior sinus wall, and also through the nose, both of which are now accessible, the dense bone under the opposite sinus is burred or rasped away until there remains only a thin shell of bone around the whole circumference of the floor of the sinus in front. Finally, with the large burr the operator must make sure that sufficient bone has been removed from the perpendicular plate, and that the agger nasi cells opposite the lachrymal bone have been broken up. The skin incision should be closed without drain and all tampons removed. Lothrop has not found it necessary to pack the nose for hæmorrhage. The subsequent treatment consists in keeping the nose clean.

Sphenoidal Sinus.—Grayson⁴ states that a large number of empyemata of the maxillary and frontal sinuses are cured after the establishment of proper drainage combined with cleansing and antiseptic irrigation. These cases include many of the chronic class. Grayson now advocates the making of an artificial opening in the anterior

wall of the sphenoidal sinus at a point as close as possible to the angle of junction of the floor with the internal wall. He considers this opening on a par with the puncture of the nasal wall of the antrum beneath the inferior turbinate, and is usually even more easily performed. The opening can be utilized for both exploratory and therapeutic purposes. The point indicated is the safest at which the sinus can be entered, as it is most remote from those intracranial structures which lie in relation to the roof and external wall of the sphenoidal sinus.

Grayson deprecates the frequently unnecessary removal of the middle turbinal in order to attack the sphenoidal sinus through the natural ostium. The floor of the sinus lies, with remarkably few exceptions, not more than 2 to 3 mm. above the crescentic line that marks the base of the sphenoidal body and the upper margin of the choana. Further, the septum between the right and left sinuses, however much it may deviate to one or other side posteriorly, almost invariably occupies the middle line anteriorly. Grayson recommends that a series of radiographs should be taken at different angles, in order that we may have all the knowledge necessary to make the opening of the sphenoid as nearly as possible free from risk.

The technique of the operation is as follows: The nasal portion of the anterior surface of the body of the sphenoid is exposed as widely as possible by shrinking the turbinates with an adrenal preparation combined with cocaine. The course of the sphenopalatine artery is now usually visible so distinctly that it can be readily avoided. Grayson now paints dilute tincture of iodine on to the operation surface, and then applies a straight drill tipped with a conical burr 6 mm. in length, and measuring $2\frac{1}{2}$ mm. from its point to its greatest diameter. Behind the conical burr there is a collar. The point of attack is 2 or 4 mm. above the line which divides the anterior from the inferior surface of the sphenoid body and close to the attachment of the ethmoid plate in the middle line. The opening that it makes is 2 mm. in diameter, quite sufficient to permit the escape of any fluid and to allow the introduction of an irrigating cannula or the distal jaw of a biting forceps, with which the opening may be enlarged. The operation is not accompanied or followed by any pain or shock, and, if the exploration be negative, the hole will close within twenty-four hours. Grayson holds that we should begin our operations upon the anterior wall of the sphenoidal sinus at the point of greatest safety, instead of ending there.

The following indications for the operation are given: (1) When we cannot be positive whether a stream of pus coming from the sphenoidal recess has its source in the posterior ethmoidal cells or in the sphenoidal sinus, or in both; (2) In certain cases of neuralgia of the fifth nerve, which may be associated with trouble in the sphenoidal sinus; certain severe and persistent headaches also come into this group; (3) Cases of nasopharyngeal catarrh in which the nasal cavities proper and the other accessory sinuses can be excluded.

Sinusitis in Children.—Nasal accessory sinus suppuration is rare in children, or at any rate is rarely recognized. Tilley⁵ showed a child, age 13, who had had scarlet fever at 7. During the last days of convalescence there had been pain and swelling over the right eye, with purulent nasal discharge. An incision was made in the eyebrow line at that time and pus evacuated. The anterior ethmoidal cells were found to be diseased and were curetted, and the frontal sinus was opened but found healthy. In December, 1914, the patient was seen again. Both eyes were closed by œdema of the upper lids. Temperature 101.5°. The old incision was reopened, and the remains of the frontal sinus was found filled with purulent granulation tissue. The wound was left open and drained, and a good recovery resulted.

Aspergillosis of the Sinuses.—Tilley⁶ has observed five cases of this condition, all in adult females. Their symptoms were as follows: marked nasal obstruction, sneezing, mucoid or mucopurulent discharge, the occasional expulsion of small masses of a whitish-grey, semi-translucent, viscous material, and neuralgic pains in the cheek and face. On examination, the nasal mucous membrane appeared pale, swollen, and œdematous. The swelling did not go down on the application of cocaine. In at least one case the middle turbinates showed polypoid degeneration. In two patients the inner antral wall was bulged inwards in the middle meatal region. Transillumination revealed opacity of both antra. On proof puncture it was impossible to get any return of the fluid—a circumstance suggesting that the cannula was in a cyst or new growth. The diagnosis is made by attention to the following points: marked nasal obstruction due to œdema of nasal mucosa; swelling does not yield to cocaine; attacks of sneezing; expulsion of semi-translucent masses; neuralgic pain; antral opacity; failure to wash through the antrum. It is clinched by the finding of the mycelium in the gelatinous material.

Tilley's cases were operated on by the Caldwell-Luc method and have not recurred. On opening the antrum, the writer was struck by the bluish-grey, glistening surface of the antral contents, which are easily separated from the walls and strongly resemble the soft contents of a muscatel raisin. The operation was accompanied by remarkably little bleeding.

Referred Pain in Sinusitis.—Bliss⁷ believes that inflammation in the sinuses or in the nasal cavity may involve the sphenopalatine ganglion and give rise to the following symptom complex: pain at the root of the nose, around the eyes, and in the jaws and teeth, extending backwards to the zygoma, ear, and mastoid, and spreading to the occiput, neck, scapula, and breast, and when severe to the arm, forearm, hand, and fingers. In addition, there are diminished sensibility of the soft palate, pharynx, tonsils, and nasal mucous membrane on the same side. Cocainization of the area of the sphenopalatine ganglion may relieve the pain for a time. In some cases the pain might be due to neuralgia of the Vidian nerve, which was

exposed in the floor of a suppurating sphenoidal sinus. In treating neuralgia of the spheno-palatine ganglion, Bliss has had considerable success with **Injections of Alcohol**, the ganglion being reached with a straight needle below the posterior end of the middle turbinal.

McNab⁸ reports three cases of shoulder-arm-hand syndrome in males between the ages of 20 and 40 years, in one of which the pain in the upper limb had lasted for over three years. Two of the cases had also occipital pain. Nasal examination showed deviation of the nasal septum to the affected side and a trace of muco-pus in the olfactory cleft. In the other two cases the middle turbinals were enlarged and polypoid. In each case McNab explored the posterior ethmoidal cells and sphenoidal sinuses. He found large cells lined with diseased mucous membrane. The whole anterior wall of the sphenoid was removed. Two of the cases at any rate quite recovered. McNab does not attempt an anatomical explanation of the referred pain. (*See above.*)

Monocular Diplopia.—McNab⁹ records the case of a female, age 45, who complained of pain in her left tonsil extending down her throat, but no lesion was found in this situation. Nasal examination showed polypoid middle turbinate, with pus oozing from the posterior ethmoidal cells and sphenoidal sinus. The patient stated that she had had double vision for three years—worse when she had a cold in her head. Under local anæsthesia the diseased cells were curetted. A complete cure was obtained.

REFERENCES.—¹*Jour. Laryngol.* 1914, 556; ²*Ann. Laryngol. Rhinol. and Otol.* 1915, Mar. 52; ³*Jour. Amer. Med. Assoc.* 1915, ii, 153; ⁴*Laryngoscope*, 1915, 65; ⁵*Jour. Laryngol. Rhinol. and Otol.* 1915, 292; ⁶*Ibid.* 145; ⁷*Amer. Jour. Med. Sci.* 1915, Feb.; ⁸*Jour. Laryngol. Rhinol. and Otol.* 1915, 334; ⁹*Ibid.* 336.

NECK, CARCINOMA OF. (*Vol.* 1915, p. 410.)

NEPHRITIS.

Aconite useful as reducing blood pressure and increasing the output of urea (p. 1). (*See also* KIDNEY, DISEASES OF.)

NERVES, INJURIES OF.

J. Ramsay Hunt, M.D.

Our knowledge of the pathology, symptomatology, and treatment of *gunshot wounds of the peripheral nerves* has been greatly enriched by careful studies of the immense material furnished by the present war. Among the more important contributions to this subject is that of Prof. Dejerine, Madame Dejerine, and Mouzon,¹ describing the various clinical types encountered and the indications for operative interference. They recognize four clinical types or syndromes: (1) Interruption; (2) Compression; (3) Irritation; (4) Restoration. In addition to these four regular types, atypical cases with curious dissociation of symptoms are recorded (*syndromes dissociés*), which are of special interest from the standpoint of fascicular localization in the peripheral nerves.

The syndrome of complete interruption of the nerve is characterized by paralysis, absence of the pain sensibility of muscle, abolition of tendon reflexes, exaggeration of the mechanical excitability of muscle, amyotrophy, reactions of degeneration; and in the sensory sphere, absence of hyperæsthesia and paræsthesia in the distribution of the nerve, absence of tenderness of the nerve trunk below the lesion; the sharp limitation, and especially the permanence of the area of anæsthesia. (The spontaneous pain and the trophic and vasomotor disturbances are variable and not characteristic.)

Regeneration of a nerve (syndrome of restoration) is shown by the presence of spontaneous pain, tenderness of the nerve trunk below the lesion, and contraction of the anæsthetic area. These sensory symptoms may appear very early, even a few days after the nerve suture, when the lesion is distal or not far distant from the cutaneous surface. The muscular symptoms of regeneration are: (1) Return of tonicity; (2) Presence of voluntary movement; (3) Disappearance of the reactions of degeneration and muscular atrophy.

The following rules for *operative intervention* are given: The existence of early signs of spontaneous regeneration, as paræsthesias or return of muscle tone, constitute a formal indication against operative intervention upon the nerve itself. If, however, the signs of regeneration are limited to a small portion of the territory supplied by the affected nerve, the question is more difficult. If the partial loss of function is limited to sensory fibres, or the nerve-supply of unimportant muscles, it is wiser not to risk an operation in order to achieve a more perfect result. If the restoration of function is alone in the sensory sphere, or important motor functions are absent, it becomes necessary to treat the nerve as in cases of complete paralysis, respecting as far as possible that portion of the injured trunk which contains normal fibres and fascicules. In cases where regeneration has taken place, but is complicated by severe pain and trophic disturbances, operation may be necessary, but under such circumstances the procedure should be strictly perineural, and no matter what the macroscopic appearance of the lesion, the tissue of the nerve itself should be scrupulously respected and not incised, carelessly manipulated, or exposed to contact with irritating antiseptic lotions. The surgery of nerves is difficult, and, in the hands of inexperienced operators unassisted by a trained neurologist, may have disastrous consequences.

Dejerine emphasizes the frequency of what he terms *syndromes dissociés*, which are produced by isolated lesions of a limited number of the fascicules which compose any given nerve—briefly, a partial wound of the nerve trunk. Often there will be found a small keloid-like mass occupying a central or lateral position on the trunk. This should be excised and the divided fascicules sutured. In the enucleation of the fibrous nodule, care and economy should be exercised in the transverse incision, and equal care should be used in removing the entire longitudinal neuromatous mass so that healthy fascicules are brought into apposition.

In the general diagnosis of nerve injuries, difficulties are often encountered because of concomitant lesions of the bones, muscles, tendons, and arteries of the extremity, which tend to obscure the clinical picture. The same is true of the psychogenic and hysterical manifestations. In differentiation, great stress is laid upon the presence of objective symptoms, e.g., absence of tonicity, modification of the reflexes, trophic disturbances, and changes in the electrical excitability of the nerves and muscles.

Pierre Marie and Benisty² give a graphic description of a painful form of gunshot wound of the median nerve. In three such cases exploratory operation showed that there was no solution of continuity, but the median nerve was surrounded by a thick fibrous sheath compressing and constricting the nerve fibres. The clinical picture is very characteristic. The patient cautiously and anxiously supports the affected hand, which is kept wrapped in a moist dressing, and hand and fingers are extended and held fixed in the long axis of the forearm, the thumb being turned toward the palmar surface. The hand appears diminished in its transverse diameter, the reverse of the picture produced by the so-called monkey hand. Frequently the fingers are the seat of a slight tremor, which is exaggerated by effort. The vasomotor and trophic disturbances have a characteristic appearance. On the dorsal surface of the hand and fingers the skin is pale, soft, and taut, not glossy; on the palmar surface it is reddish, with transverse folds; later, there is thickening and desquamation of the epidermis. The affected hand is distinctly warmer than that of the sound side. Sweating is less than is usually found in median-nerve lesions, and is confined to the dorsal surface of the fingers. Especially characteristic is the pain, which is atrocious and intolerable. It is exaggerated by dry heat, and all the patients keep the painful member enveloped in wet dressings, which are renewed as often as possible. The pain is awakened or exaggerated by the slightest contact, even contact involving other portions of the body, e.g., touching a dry or warm substance with the well hand. Even a deep inspiration, a laugh, or a simple emotion, may excite and exaggerate the suffering. The pain and the vasomotor and trophic disturbances are not always confined to the median distribution, but may extend to the domain of the ulnar nerve, when the clinical and electrical examinations and the operation, fail to reveal any evidences of a wound of the ulnar nerve. Thus, there is a certain similarity to the clinical picture of the ascending neuritis.

They conclude with the interesting suggestion that, generally speaking, each nerve of the upper extremity reacts in a special manner to gunshot wounds: the radial by motor paralysis; the ulnar by atrophy and deformity of the hand (griffin-claw); and the median by pain and vasomotor and trophic disturbances. In their study of the wounds of the lower extremity, a similar individuality of the clinical picture was observed: wounds of the sciatic, like the median, are essentially painful, as are lesions of the internal

popliteal, while the external popliteal resembles the radial in its characteristics, and is paralytic in type, not painful.

Some idea of the relative frequency of involvement from gunshot wounds of the different peripheral nerves may be obtained from Mouchet's³ series of 100 cases. In this series the median nerve was involved in 36 cases, the ulnar in 31, the radial in 21, the external popliteal in 6, and the main trunk of the sciatic in 6. In half the cases involving the trunk of the sciatic, the paralytic symptoms were limited to the distribution of the external popliteal nerve. Curious pathological conditions are described, viz., intrafascicular, circumferential, and lateral localization of the neuromatosis. Rarely the nerve sheath is the seat of an extensive soft, fungoid œdema. Adherence of the neuromatous tissue to neighbouring vessels and muscles is not uncommon, and adds considerably to the difficulties of the operative procedure.

Tubby⁴ records cases of *concussion of the nerve trunks* due to bullet and shell wounds, caused by physiological blocking of the nerve fibres, the effects of which are only temporary. The essential point in the recognition of this form of lesion is the early appearance of return of voluntary movement in muscles which have been completely paralyzed. The clinical and surgical importance of this group of cases is obvious.

Coryllos and Pecker⁵ devote special attention to the symptomatology and treatment of the *constriction of nerves by cicatricial tissue*, which is so common a sequel of gunshot wounds.

The various diagnostic difficulties sometimes encountered are emphasized by Claude, Vigouroux, and Dumas,⁶ e.g., a neural lesion may be simulated by ankylosis of the joints, the contractures of vicious or painful cicatrices, or the retraction and adherence of tendons to neighbouring parts. The frequency and importance of contractures of psychic origin are also considered. As a diagnostic method the testing of the electrical excitability of the nerve in the wound has been systematically practised, sometimes with striking results. This procedure under aseptic precautions is without danger. In accord with other observers, they note the great frequency of sharply limited lesions of the nerve trunk, e.g., central wounds or perforations, with the formation of central neuromatous nodules surrounded by healthy nerve tissue; similar lesions, but situated on the lateral aspect of the nerve trunk, and a perineural sclerosis. Induration of the nerve without section of the nerve fibres, resulting from transverse neuritis, is also described. As with most other writers, they insist on the great importance of conservatism in the surgery of nerves, and recommend, above all else, the liberation of the nerve trunk and its mobilization in healthy tissue. Resection of cicatricial tissue should not be practised when this would serve as a bridge between divided nerve bundles. Nerve suture should only be performed as a means of bringing divided ends in continuity.

Pozzi⁷ devotes a special communication to the important subject of the surgical treatment of nerve injuries. He opposes in very forcible language their radical treatment, and especially the mode which has been advocated by Delorme. By the Delorme method not only is the injured trunk subjected to extensive dissections with breaking up of adhesions, but those portions of the trunk which do not appear normal to the naked eye are resected. Multiple and even successive resections are practised until fresh and healthy surfaces are exposed and sutured. As much as 10 or 15 cm. of the nerve trunk may thus be sacrificed, necessitating extreme and special flexion postures during union. Pozzi justly emphasizes the inadequacy of the naked eye in condemning a portion of the nerve trunk which is only changed in colour or in size, and in which there is no obvious or gross solution of continuity, and recommends adherence to the conservative methods of the past, namely, exploration, breaking up of adhesions (neurolysis), and nerve anastomosis.

An important suggestion for the treatment of old paralyses consequent upon gunshot wounds has been made by Claude, Dumas, and Porak⁸ under the title of *functional adaptation by substitution in traumatic paralyses of nerves*. It is a common observation, which most clinicians will recall, that in paralysis, especially of the upper extremity, the principal muscle or group of muscles subserving a certain function being paralyzed, a somewhat similar movement may eventually be brought about through the action of accessory muscles: e.g., in the paralysis of the flexors of the elbow a certain amount of flexion is often possible by contraction of the flexors of the forearm. The authors have utilized and systematized this principle in the hope of benefiting those in whom a certain nerve distribution has been permanently paralyzed. There is thus elaborated a kind of special and abnormal muscular physiology which, when enriched by further observations, deserves a place with the usual physiology of muscular movements. It is especially in the upper extremities that functional adaptations are possible; it is, however, applicable, but in a lesser degree, in the lower limbs. It is undesirable that the patient should be trained in abnormal adaptive methods in the early stage of a paralysis; but only later, when it is decided that the paralysis is incurable, should it be attempted. Among the examples of this procedure which may be mentioned are: (1) Substitution of the median by the ulnar; false apposition of the thumb by the adductor and internal head of the flexor brevis pollicis. (2) Substitution of the median and ulnar by the radial: (a) adduction of the thumb by the extensor proprius pollicis, (b) flexion of the fingers and prehension by the extensors of the thumb and fingers, (c) flexion of the wrist by the extensor longus and extensor brevis pollicis.

REFERENCES.—¹*Presse Méd.* 1915, 153; ²*Ibid.* 81; ³*Ibid.* 91; ⁴*Brit. Med. Jour.* 1915, i, 57; ⁵*Presse Méd.* 1915, 41; ⁶*Ibid.* 65; ⁷*Ibid.* 49; ⁸*Ibid.* 205.

NEURALGIA.*J. Ramsay Hunt, M.D.*

In recent years the **Alcohol Injection** treatment of facial neuralgia by the method of Schlösser has been still further perfected by the elaboration of a technique for the subcutaneous injection of the Gasserian ganglion itself. Taptas, Wilfred Harris, and Härtel have been the pioneers in this field of investigation. C. M. Byrnes¹ presents an elaborate clinical and experimental study upon the injection of alcohol into the Gasserian ganglion for the relief of trigeminal neuralgia. Some of his more important conclusions are as follows:—

A single successful injection of alcohol into the Gasserian ganglion is followed by immediate relief of pain and all the symptoms indicative of its complete physiological destruction. Although a general anæsthetic is not administered, the painfulness of the injection is not unbearable, or greater than is experienced in making deep intra-neural injections. In experienced hands, it is without serious risk, and no fatalities have been recorded as a direct result of the injection. In spite of the contentions of some observers, injections in man by exposure of the ganglion appear to be unwarranted and lacking in judgement, except in rare cases in which this slight saving of time may determine the immediate result during exposure of the ganglion. It is conceivable that in performing the subtemporal operation for removal of the ganglion, emergencies might arise which would demand prompt closure of the incision, or prevent further approach to the ganglion. Under these conditions, if the ganglion is in view or accessible, direct injection might be practised; otherwise the original operation for removal or avulsion of the root should be employed. If deep neural injections have been unsuccessful, and repeated attempts to inject the ganglion by the subcutaneous method have failed, an effort might be made to inject through the exposed foramen ovale before resorting to the subtemporal operation for removal. It has been demonstrated, by fractional injection, that the extent of destruction may be, in a measure, limited to that portion of the ganglion from which the affected nerve trunk originates, and that not infrequently the corneal fibres can be spared. In cases of bilateral trigeminal neuralgia, injection of the ganglion possesses distinct advantages over other methods of radical treatment. Since anatomical continuity is not actually destroyed and the motor nucleus is not directly affected, conditions are most favourable for recovery of motor function, while sensation should be permanently lost if the ganglion is completely destroyed. Thus, by allowing sufficient time for regeneration in the motor root, bilateral ganglionolysis might be safely practised. Clinical observations have been too recent to furnish reliable information as to the permanency of relief after ganglionic injections; and experimental studies appear to indicate that it is not probable that the ganglion can be completely destroyed by a single injection of alcohol. It is Byrnes's opinion, however, that by repeated injections of the ganglion its complete destruction may finally be accomplished.

Wilfred Harris² relates his experiences with alcohol injections. He has treated some 200 cases of chronic trigeminal neuralgia by this method. For the technique of the procedure the original should be consulted, as the methods employed in reaching the foramen rotundum and the foramen ovale are difficult and not without danger. As with others who adopt this treatment, he states that it should not be used on mixed nerves, because of the motor palsy which supervenes. This is of less importance in the injection of the third branch at the foramen ovale, which includes the motor fifth, as the function of chewing is carried out usually on the opposite side because of the resulting anaesthesia. In neuralgia of the second division, peripheral injections of the nerve through the infra-orbital foramen are usually insufficient, and it is better to attack the nerve directly at the foramen rotundum. After injections of the Gasserian ganglion at the foramen ovale, great attention should be given to the eye to avoid keratitis. If the anaesthesia in the first division clears up quickly, the dangers of keratitis are slight. If it is persistent, the keratitis is almost sure to develop, and the usual methods should be taken to protect the cornea. He advises sewing up the eyelids, leaving a chink at either canthus for irrigation with salt solution. In sixty cases of injection of the ganglion, diplopia occurred only once—due to a paralysis of the abducens nerve—which lasted three months. In another case, during the injection sudden vertigo developed, with nystagmus, deafness, and facial palsy. Fortunately these were only transient complications, and disappeared in five days. These mishaps, however, show the possible dangers of the method even in skilled hands.

A. B. Kanavel³ has devised an ingenious method of **Osteoplastic Closure of the Trifacial Foramina** for the relief of neuralgic affections. The method was first perfected by experiments on the dog, and was subsequently applied with success to man as a surgical procedure. It is designed to replace those operations in which the foramen was plugged by some foreign substance. Kanavel believes that it may prove of benefit in that group of cases in which the more serious intracranial procedures are contra-indicated, and in which alcohol injections fail to give relief. The steps of the operation consist of avulsion of the nerve, followed by curettage of the bony canal, breaking down of the foramen, and covering the area as well as possible by a pedicle-flap of adjacent periosteum, or a transplant of bone and periosteum made from the tibia. Methods are detailed for the eradication of both the infra-orbital and the inferior dental canals.

For the application of **Electricity** in treatment see page 65.

REFERENCES.—¹*Johns Hop. Hosp. Bull.* 1915, 1; ²*Jour. Amer. Med. Assoc.* 1914, ii, 1725; ³*Ibid.* 1245.

NEURASTHENIA.

J. Ramsay Hunt, M.D.

The large clinical group of neurasthenia is contracting more and more with the refinements of clinical and laboratory technique, by means of which more exact diagnoses are rendered possible. What

were once regarded as merely obscure functional nervous states are now often traced back to a primary visceral or autotoxic cause. This is right and proper, and the gradual 'passing of neurasthenia' is a sign of the times and of the advancement of medical science.

That the passing of neurasthenia may be unduly accelerated has been demonstrated by G. D. Head,¹ who has approached this subject in its relation to *concealed tuberculosis*. His statements, while very interesting and suggestive, are far too sweeping. After presenting the fifteen cases on which his report is based, the following modest conclusions are reached: Many individuals exhibiting the symptom-syndrome of so-called neurasthenia harbour a tuberculous infection, and this only. The tuberculous process in most cases is so concealed as to escape detection by the usual clinical examination methods employed, and a specific test must be used to reveal its presence. In the light of this evidence, these cases should be diagnosed as tuberculosis, and not neurasthenia. We should recognize and adopt a new clinical symptom-type for concealed tuberculosis. This symptom-type is the symptom-complex now recognized by clinicians the world over as neurasthenia.

REFERENCE.—¹*Jour. Amer. Med. Assoc.* 1914, ii, 996.

NEUROSES IN CHILDREN. (*Vol.* 1915, p. 417.)

NOSE, DISEASES OF.

J. S. Fraser, M.B., F.R.C.S.

Anterior Nares.—Batroff¹ has been impressed with the results obtained by Halle and Joseph, of Berlin, in the **Plastic Surgery** of the nose and nasal orifices. He states that pathological collapse of the alæ nasi occurs during forcible inspiration. Normally these structures should slightly dilate with deep breathing. The patency of the nostrils is maintained by (1) The normal resiliency of the wings of the nose; (2) The presence of the alar cartilage; (3) The muscles that act on the alæ nasi. With partial closure of the nasal wings, mouth-breathing occurs. This results in continuous negative pressure in the nose, producing chronic hyperæmia with secondary hypertrophic changes. Neurotic patients complain bitterly under these circumstances. Collapse of the alæ occurs as a secondary affection in individuals who have suffered from nasal obstruction for years. The causes of alar collapse are: (1) Atrophy of the levator muscles; (2) Relaxation of the subcutaneous tissue; and (3) Sharp vertical curvature of the alar cartilage.

Anomalies of the septum membranaceum (commonly called the columella) have received little attention. It may be very broad, thus narrowing the lumen of the nostrils: this may be due to the anterior inferior nasal spine projecting sharply forward. Treatment has generally taken the form of (1) Some splint or dilator. These vary from rings of soft rubber tubing to the anatomically perfect, hard rubber type of Schmidhuisen. These appliances prevent the normal vibration of the alæ, which regulate the intake of air. (2)

Cotton balls coated with vaseline and tucked into the navicular fossa (Heerman) permit proper exercise of the muscles. (3) Exercising the atrophied muscles against slight resistance before a mirror (Lambert Lack). (4) Should the alar cartilage be so sharply bent that the upper edge lies against the septum, it is advisable to make an intranasal incision under local anæsthesia through the mucosa, parallel to and slightly below the upper edge of the alar cartilage; the surgeon now elevates the mucosa, cuts away a narrow strip of the cartilage to restore the lumen of the nostril, inserts a stitch, and applies collodion. (5) If the alar cartilage is thin and flabby, Menzel advises the injection of paraffin between the skin and cartilage, after packing the vestibule tightly with gauze. If more than the right amount of paraffin be injected, the cosmetic effect is seriously impaired. (6) Should deviation or subluxation of the septal cartilage be the cause, it must be corrected by the usual submucous resection. (7) Exostoses of the nasal floor, or thickening of the anterior inferior nasal spine, may be removed through an intranasal incision at the mucocutaneous junction; after elevation of the mucoperiosteum, the projecting bone is chiselled away. (8) A cone-shaped septum membranaceum should be dealt with as follows: A curved incision is made at the junction of the skin and mucous membrane parallel with the edge of the membranous septum. The skin is retracted downwards and the mucous membrane elevated. The thickened parts, such as the subcutaneous and submucous tissues, are carefully cut away with a sharp knife. The operator is now confronted with the excessive width of the skin that is left. The needle, threaded with heavy silk, is passed through the skin segment close to the lip, then brought forward over a piece of gauze to the tip and passed through here. Another piece of gauze is placed on the opposite side and the suture firmly tied. In this way the edges of the reduced septum membranaceum are firmly pressed together by mattress sutures. The gauze pads prevent the suture from cutting through the tissues. The stitches are removed in four days.

The columnar cartilage which forms the framework of the columella is the median half of the lower lateral cartilage. Each of these median halves should lie flat against its fellow of the opposite side. In cases in which the cartilage is dislocated, Warren² advises the following procedure: The entire region of the deformity having been injected subcutaneously with either 2 per cent cocaine or novocain solution, a vertical incision is made through the skin just in front of the mucocutaneous junction. This should extend from the upper to the lower limits of the deformity. This leaves any resulting scar well within the vestibule of the nose. Dissection is now carried out by means of a dull, narrow-bladed scalpel down to the dislocated, or posterior, edge of the columnar cartilage. This edge is then grasped with a small, curved hæmostat forceps, which serves both to lift the cartilage from its fascial bed and to obviate the use of retractors in so small a space. The perichondrium is separated from

the cartilage, below to its lower end and above to the upper limits of the deformity, where the cartilage is cut across and the piece removed. There is now a redundancy of tissue which necessitates the removal of a strip of skin from the edge of the wound nearer the operator.

Septum Nasi.—Dan McKenzie³ has introduced rubber drainage tubes, oval on section, in the after-treatment of submucous resection of the septum. One tube is introduced into each nostril, and together they hold the muco-perichondrial flaps in place. The patient is able to breathe through the lumen of the rubber tubes. Milligan, after removing a sufficient amount of bone and cartilage, coats the raw surfaces with **Whitehead's Varnish** (gum benzoin, 4 dr.; styrax, 3 dr.; socotrine aloes, 40 gr.; balsam of Tolu, 1 dr.; iodoform, 4 dr.; pure ether, 5 oz.), and then brings these surfaces together. Since using this varnish, Milligan has not seen a hæmatoma, and patients have expressed appreciation of their ability to breathe through the nose immediately after the operation. StClair Thomson never packs the nasal cavities if accessory sinus trouble is present, and finds that in spite of this the results of septal resection are very good. For some years, after resecting the septum he has put most of the pieces back again, making a kind of mosaic between the two flaps. To keep the pieces in position, he inserts small rubber sponge plugs. In reply, Milligan stated that if the naso-palatine artery bled freely, he needed it with a Krause's hook, and then, on painting it over with the varnish, the bleeding stopped.

Ozæna.—McGowan⁴ states that the '*Cocco-bacillus fætidus ozænæ*' of Perez is a Gram-negative organism which is said to give rise in all culture media to the characteristic foul smell of ozæna. Experimental infection (by intravenous injection) of the rabbit may be acute, subacute, or chronic. At the beginning of the infection there is a very intense nasal secretion, along with inflammation of the mucous membrane of the anterior turbinates. The organism has, therefore, an undoubted selective action on the nasal mucosa, which, post mortem, is hyperæmic and covered with mucus, from which one can recover the original organism. Perez claims he can produce experimentally in the rabbit, the atrophy which is characteristic of true ozæna. He also states that his cocco-bacillus of ozæna exists normally in the nasal cavities of the dog, and increases in animals suffering from distemper.

Horne⁵ acknowledges that the millennium in the treatment of ozæna has not arrived, that the isolation of the causal organism is not easy, and that the preparation of vaccines is a matter of great difficulty. Ozæna is far more common in Europe than in America, and for this reason the international investigation has fallen flat in the United States. Horne believes that in properly prepared **Vaccines** we have a potent factor for improvement. They cause disappearance of the odour and reduce crusting to a minimum. The method is as follows: A crust is taken from the nose, dropped into a bouillon

tube, and incubated for twelve hours. At the end of this period one drop from the tube is spread over from 3 to 5 agar Petri dishes. These are incubated for twenty-four hours, and then the separate colonies are transferred to agar slants. In fishing for the colonies, a great deal of experience and judgement is necessary.

Horne admits that cases of apparently true ozæna have been vastly improved by the administration of stock Vaccines containing the Friedländer bacillus, *Micrococcus catarrhalis*, pneumococcus, and streptococcus. He therefore suggests that ozæna may be a mixed infection, and secondly, that there may be certain types which appear clinically to be cases of true ozæna and yet are not due to Perez's organism. Horne thinks that perhaps better results might be obtained if a stock mixed vaccine were used before the injection of the vaccine made from Perez's organism. It is in practice almost impossible to employ autogenous vaccines of this latter bacillus, and for this reason most of the vaccines are made from seven or eight different strains, to which has been added one strain of the Perez bacillus which occurs normally on the mucous membrane of the nose of dogs. The clinical manifestations are the best guide to dosage, and a period of at least one week should intervene between injections. An initial dose of 50 million, doubling until the proper constitutional symptoms develop, is about correct. The general reactions are: rise of temperature, loss of weight, malaise, and vomiting. The local reactions are: redness and swelling around the injection, and swelling of adjacent glands. Symptoms referable to the nose are: coryza, free discharge from the nose, sensations of heat and fullness over the bridge. The improvement is usually noted by the patient after the first dose, while the parents remark a change for the better in the objective bad smell. The crusts blow out more readily, and the feeling of tightness across the forehead is improved. From five to fifteen injections are considered necessary, and even then the patient must be carefully watched for a relapse.

Hutchison⁶ states that Gautier, in 1892, advocated the treatment of ozæna by electrolysis, or, as we should now term it, by **ionization**, with copper. Currents of 15-20 ma. are applied for fifteen minutes or longer, the parts being well cocainized beforehand. Another method is to use copper rods covered with moist material wetted with a solution of sulphate of copper. Leduc has treated ozæna by means of a zinc electrode wrapped in cotton-wool soaked in a solution of a zinc salt. It is better to pack the nose with a long strip of gauze moistened with the required solution; the electrode is buried in the middle of the gauze. Hutchison, however, advises the use of a J-shaped glass tube, $\frac{1}{2}$ in. in diameter and about 10 in. long. The upper end of the tube is expanded into a funnel, while the tip at the lower end is blown into an olive like that used on the Politzer's bag. The patient sits at a table with his head bent well forward over a basin, takes the tube in one hand, and fits the olive tightly into one nostril, the stem of the tube lying upright be-

side the ear. The surgeon then pours the desired fluid into the tube till a few drops flow out of the other nostril. If both sides of the nose are to be treated, two tubes are used. The electrode should be in position in the tube before the latter is adjusted into the patient's nostril. The nasal electrode is connected to the positive pole, while the indifferent electrode is placed in a basin of water in which the patient's free hand is immersed. To begin with, the solution of zinc sulphate should not be stronger than 1 gr. to the ounce. During the sitting the patient must breathe through the mouth and must not swallow, as this act sucks the fluid out of the tube, and so may break the circuit and cause an unpleasant shock. Hutchison has obtained useful results in *ozæna* and has given great relief in cases complaining of watery nasal discharge associated at night with nasal obstruction.

Lupus.—Gerber⁷ calls attention to the necessity for the early diagnosis of lupus by the rhinologist, as the most frequent and severe form of lupus, viz., central lupus of the face, begins in the nasal mucosa. The intranasal disease is very difficult to diagnose at first unless a histological examination is carried out.

Sporotrichosis.—Sezura⁸ records eleven cases of sporotrichosis of the nasal and pharyngeal mucosa. The changes are very like those seen in leprosy or gumma, and are often mistaken for these conditions. The Wassermann reaction and the cutaneous reaction are negative in all cases. Treatment with **Potassium Iodide** results in rapid cure. In one case, however, a carcinoma developed. The fungus is easily recognized in pieces cut out for microscopic examination, while in some cases the agglutination test is positive.

REFERENCES.—¹*Laryngoscope*, 1915, 72; ²*Ibid.* 81; ³*Ibid.* 277; ⁴*Ibid.* 57; ⁵*Jour. Amer. Med. Assoc.* 1915, ii, 788; ⁶*Jour. Laryngol. Otol. and Rhinol.* 1915, Oct. 27; ⁷*Zeits. f. Ohrenheilk.* lxxii, 99; ⁸*Arch. Internat. Med.* xxxvi, No. 1.

NOSE, GUNSHOT WOUNDS OF. (*See THROAT AND NOSE, WOUNDS OF.*)

ŒSOPHAGUS, DISEASES OF.

J. S. Fraser, M.B., F.R.C.S.

Simple Inflammatory Stenosis.—Hitherto strictures of the gullet have been classified into (1) Malignant; (2) Traumatic; and (3) Spasmodic. Simple inflammatory stenosis has not been recognized, though, according to McKinney,¹ such a condition may at times endanger life. The œsophagoscopy examination is best made without the aid of cocaine, as this drug causes blanching and retraction of the tissues. The commonest symptom of simple inflammatory stenosis is regurgitation of food. There is no pain whatsoever, but, should the stricture continue long enough, there is loss of weight. The treatment consists in gradual **Dilatation** applied through the œsophagoscope, no anæsthesia being necessary. Guisez says that the œsophagus may become completely stenosed under the influence of irritation and of simple chronic inflammation. He finds that inflammatory stenoses occur at the contracted extremities of the gullet.

They may be due to two causes : (1) Simple thickening of the wall following œsophagitis due to chronic irritation by indigestion or alcohol ; (2) Spasms terminating in permanent stenosis. Stasis of food following the spasm causes inflammation of the œsophageal wall which results in cicatricial degeneration. The initial spasm occurs in patients who eat rapidly and masticate poorly. The condition is to be differentiated from cardiospasm, since the latter condition causes hypertrophy of the œsophageal musculature, with atony and dilatation above, but does not cause a true organic annular stricture. McKinney believes that there is always a primary œsophagitis, due to localized irritation, in organic inflammatory strictures. Simple œsophageal strictures are not transitory ; when they once begin, they continue gradually to grow worse. They are not due to hysteria. McKinney holds that it is comparatively easy to exclude cancer, as the simple strictures are annular, attended by no pain, and easily treated. Guisez has seen twelve cases of inflammatory stenosis, six of which occurred at the cardiac end. McKinney's cases number four, and the cervical region was affected in all. He finds that the area of constriction is always more deeply congested than the part above. Dilatation should be practised with extreme care for fear of rupturing the wall of the gullet. This accident occurred in a case of McKinney's, caused by the accidental swallowing of concentrated lye. During McKinney's absence the patient was removed from his wards by a general surgeon, who attempted reversed dilatation through a gastric fistula. The patient died within twenty-four hours.

Syphilis.—Wile² remarks that the comparative immunity of the œsophagus to syphilitic affections is remarkable. In a number of the cases of syphilis of the œsophagus which have been described, there were lesions in the mouth or pharynx. This suggests a special localization of the disease in the digestive system. Wile describes a case which, on œsophagoscopy examination, showed a marked sclerosis of the entire tube, with two definite strictures—one at the upper and one at the lower end. Immediately above each of these there was a dilated portion. **Salvarsan** and **Mercury**, combined with surgical **Dilatation**, gave rise to marked improvement. The differential diagnosis of the disease is often extremely difficult, especially in the late stages with marked cachexia. If two strictures be present, separated by a comparatively normal portion of gullet, syphilis rather than malignant disease is suggested. It is not improbable that many cases which are supposed to be cancers are really due to syphilis, and it is likely that the same relation which exists between gumma and cancer of the tongue also obtains with reference to gumma and cancer of the œsophagus.

Pulsion Diverticulum.—Gaub and Chevalier Jackson³ state that pulsion diverticulum of the œsophagus [hypopharynx ?—J. S. F.] if not removed, increases in size until it becomes a serious menace to the patient's health and even to life. It gives rise to dysphagia because, when the sac becomes filled, it compresses the food passage. Cough,

purulent expectoration, and bad breath are other symptoms of the condition, which only occurs in patients past middle life. Most cases are decidedly senile and suffer from chronic bronchitis.

Operative **Extirpation** is the only treatment worthy of consideration, and the writers claim that their method (external dissection by the general surgeon, combined with endoscopy by the specialist) has reduced the duration of the operation by more than one-half. A preliminary radiograph shows a circular shadow above the episternal notch—[thus demonstrating that the diverticulum is in the hypopharynx.—J. S. F.]

Intratracheal ether anaesthesia should always be used. The landmark to bear in mind is the cricoid cartilage. A large vertical extent of wound must be maintained, and must be kept clean and dry by careful hæmostasis. The cricoid cartilage and the subjacent rings of the trachea must be identified. The œsophagus will be discovered posteriorly to the cricoid and trachea as a thin flat fold pressed against the cervical vertebræ. The surgeon now asks the œsophagoscopist to pass the endoscopy tube into the pouch and to push out the diverticulum into the external wound. The surgeon seizes the bottom of the pouch with forceps. He then asks the œsophagoscopist to insert the œsophagoscope into the subdiverticular lumen of the œsophagus, and amputates the redundancy, being careful not to make undue tension in order to determine with precision the amount of tissue which really constitutes redundancy. In one case the stump externally was lightly touched with pure carbolic acid, and supporting sutures were inserted. The patient was fed by a catheter inserted by œsophagoscopy.

Achalasia of the Cardia.—Hertz¹ applies this term to the condition which is commonly called cardiospasm, or idiopathic dilatation of the œsophagus. By achalasia he understands an absence of the normal relaxation of the cardia. Morell Mackenzie believed that the condition was due to general weakness of the muscle of the œsophagus, but this theory does not explain the hypertrophy which is always present, and which indicates that the œsophagus has been trying to overcome some obstruction. As no organic obstruction is ever found, it is clear that the condition must be functional. There is no hypertrophy of the cardiac sphincter after death, in marked contrast to the condition found in the spasmodically contracted sphincter seen in hypertrophic pyloric stenosis of infants. Hertz therefore concludes that there is a failure in the co-ordinating mechanism by which the cardiac sphincter is relaxed during swallowing. X-ray examinations show that barium-containing food passes very quickly down the gullet to the cardia, where there is a momentary pause, the lower extremity of the shadow ending in a fine point corresponding to the cardiac orifice of the stomach. A moment afterwards the food is seen to pass into the stomach. Keith has demonstrated that a true cardiac sphincter does exist, and experiments on animals have shown that the cardia relaxes when each peri-

static wave passing down the œsophagus in the act of swallowing reaches the lower end. Cannon has shown that section of the vagi in animals below the origin of the recurrent laryngeal nerve prevents the normal relaxation of the cardia, and leads to accumulation of food and consequent dilatation. In some cases the œsophagus is lengthened as well as dilated.

The age at onset of the condition in six of Hertz's cases varied from 26 to 65, but instances are recorded as young as 8 years. The sexes are equally affected. The condition develops gradually, a slight attack lasting for a day or two being followed by a period of freedom for several weeks. Attacks recur at gradually shorter intervals, and finally the condition becomes permanent. In the majority of cases no obvious cause can be discovered either during life or after death. The attacks often begin in the morning, the patient experiencing difficulty in swallowing his saliva on awakening. Later the patient feels that the food will not go down, and that it fills up his chest. He may notice gurgling, as if gas was bubbling through water. Salivation occurs in almost every case. Shortly after a meal the patient brings up the greater part of what he has eaten, mixed with saliva. Generally he does this quite easily, but occasionally needs to tickle his throat. The œsophagoscope shows the cardiac orifice completely closed. The mucous membrane of the gullet is often inflamed and shows superficial erosions. The general health at first remains perfectly good, though weight is rapidly lost. After a time a condition of equilibrium develops and the patient loses no more weight. Constipation is naturally very marked.

The symptoms are generally characteristic, and on x-ray examination the diagnosis of œsophageal obstruction is confirmed when the patient attempts to swallow thick porridge and milk with barium sulphate. This examination must of course be made during an attack. The only organic disease which requires consideration is cancer, as in cases of caustic poisoning a history is generally obtainable. In achalasia a mercury tube passes through the cardia with great ease, in contrast with the complete obstruction to its passage offered by a growth.

If the condition is recognized at the onset, a permanent cure often results; but if treatment is only instituted when the œsophagus is greatly dilated, success is less likely.

The simplest and most effective treatment is by means of a **Mercury Tube** of 24 gauge. The tube has a rounded end and is filled with mercury. A string is attached to the upper end to prevent the possibility of its dropping into the stomach, and two circles are marked on the bougie at distances of 16 and 17 inches respectively from its lower end. The tube drops through the cardia, and is easily managed by the patient himself. The lower extremity should pass more than an inch beyond the cardia, which is situated 16 inches from the teeth. The patient realizes that the passage is clear as soon as the tube is withdrawn. It should be passed immediately

before meals at first, later once a day, and gradually less often, until finally it is only passed at rare intervals. It occasionally happens, when the œsophagus is greatly dilated, that the end of the tube misses the cardia and curls round in the pouch. Under these circumstances the treatment described in the MEDICAL ANNUAL, 1915 (page 432) may be instituted.

Peptic Ulcer.—A. E. Barclay⁵ records the case of a girl, age 18, who complained of difficulty in swallowing, and stated that at one time she had brought up blood. Radiographic examination showed complete obstruction at the level of the seventh dorsal vertebra. The obstruction persisted for ten minutes at a time, and was clearly due to spasm. Œsophagoscopy by Milligan showed a small ulcer a quarter of an inch in diameter. The case was successfully treated by Zinc Ionization.

REFERENCES.—¹*Laryngoscope*, 1915, 354; ²*Amer. Jour. Med. Sci.* 1914, ii, 180; ³*Surg. Gyn. and Obst.* 1915, ii, 52; ⁴*Quart. Jour. Med.* 1915, July, 300; ⁵*Proc. Roy. Soc. Med.* 1915, May.

ONYCHIA.

Ionic Medication recommended (p. 67).

OROYA FEVER.

Sir Leonard Rogers, M.D., F.R.C.P.

Richard P. Strong, E. E. Tyzzer, and A. W. Sellards¹ have published a second report of their investigations of this disease in South America. In their first report (see MEDICAL ANNUAL, 1915, p. 675) they showed that the disease is probably due to an organism in the red corpuscles first described by Barton, and also concluded that this fever has no relationship to the skin lesions of verruga peruviana. In the present report they discuss the distribution in Peru, and suggest that it may be found in other countries. It is most prevalent from January to April, especially towards the close of the warm rainy season. In severe forms the fever is irregular and accompanied by a rapid and often fatal pernicious form of anæmia which may terminate within three or four weeks. The incubation period is said to be about twenty days. The fever is usually irregularly remittent and intermittent, and the red corpuscles may fall to 1,000,000. Diarrhœa sometimes sets in. In recovering cases, improvement begins after twenty-five to thirty days. The mortality is usually from 30 to 40 per cent. The spleen is frequently enlarged, the liver sometimes so, the glands almost always more or less. The blood shows normoblasts and megaloblasts; leucocytosis is almost always present, 20,000 being common without material change in the proportions. Myelocytes may be present. The hæmoglobin may fall to 15 per cent. The organism they have named *Bartonella bacilliformis* is present in the red corpuscles, although difficult to see in fresh blood. In a further report² they give a brief history of previous investigations, and then discuss the pathology of the disease in the light of their own work. Post mortem, the anæmia is the most marked feature, while the superficial and mesenteric lymphatic glands are enlarged and

reddish. Microscopically, the liver shows toxic degeneration and yellowish iron-free pigment. The spleen shows infarctions, degeneration, and pigmentation; the bone-marrow shows phagocytosis of the red corpuscles by the endothelial leucocytes, which is also seen in the liver and spleen. The lymphatic glands show the most marked changes, with swollen endothelial cells containing the parasite in large numbers. The large intestine may show undermined ulcers.

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1915, i, 806; ²*Ibid.* 965.

OSTEOMYELITIS.

W. I. de C. Wheeler, F.R.C.S.I.

Simmons¹ summarizes a short but exhaustive paper on the treatment of osteomyelitis as follows: (1) In children with pain in a limb and evidence of toxæmia, always consider osteomyelitis. (2) Operate early, even if the symptoms are rather vague. (3) In acute cases, open the medulla and pack the wound. The prognosis is good. (4) In cases where bone destruction has taken place, seen less than three months after the onset of the disease, perform subperiosteal resection when possible. The prognosis is good. (5) In chronic cases of bone abscess, drain and pack. (6) In chronic cases, with bone destruction, remove sequestrum and pack. (7) In old chronic cases either with bone destruction or of the bone-abscess type, remove necrotic areas and drain. Try to obliterate the cavity with flaps of living tissue. If this cannot be done, either use bone-wax and pack, or sterilize cavity, allow it to fill with blood-clot, and close without drainage. (8) The treatment, when such bones as the pelvis are involved, is unsatisfactory, and the prognosis problematical. (9) When in old chronic cases the whole shaft of a long bone is badly diseased, resection of the entire shaft, with bone-transplantation, should be considered before amputation is resorted to.

H. S. Dunning² draws attention to cases of *osteomyelitis of the lower jaw*. He points out the comparative frequency of this condition in spite of the wonderful blood-supply of the part. The alveolar processes of the jaws become infected and necrosed, for obvious reasons, more often than any other bones in the body. Infected teeth are insidious 'volcanoes' that need very little to start them off into active eruption. Necrosis is generally a self-limited process, but the entire inferior maxilla not infrequently becomes necrotic. The infection from the teeth gets into the inferior dental canal and blocks the inferior dental artery, and necrosis of the region supplied by the artery will follow. A bacteriological examination generally reveals streptococcus infection. Dunning thinks that the dentist is partly responsible for frequent necrosis of the maxilla by his passion for saving teeth. Teeth that are badly broken down and abscessed ought to be extracted at once before they cause consecutive necrosis. If the infection has had time to invade the bone, the abscess cannot always be made to drain up-hill through the tooth alveolus into the mouth, and in this case a free incision should be made along the alveolar process directly over the apex of the infected tooth. Treat-

ment of chronic cases of osteomyelitis should consist chiefly in establishing and maintaining good drainage and in free irrigation of the part. Sinuses should be kept open with iodoform gauze. The curette should not be used too vigorously, as the area of necrosis may be increased by injuring the new bone-cells that are forming in the osteogenetic layer. It is rather the surgeon's duty to remove the sequestrum when it is formed. McWilliams, who writes conjointly in the same paper, states that in rare instances a large defect in the bone may require the grafting of new bone. If bone-grafting becomes necessary, the operation must be done from the outside and the mucous membrane not opened. All sinuses should in the first instance be allowed to heal. Here as elsewhere the graft should always retain its periosteum, and should be taken preferably from the tibia. McWilliams concludes by advising co-operation of a skilful dental surgeon in cases of osteomyelitis and necrosis of the inferior maxilla. Stiles, of Edinburgh, treats the lower jaw in tuberculous cases in the same way as tuberculous disease of the other bones in children. The jaw is subperiosteally divided clear of the disease, and after division or rupture of the inferior dental artery and nerve, the bone is wrenched through the epiphysial line from the epiphysis, which remains uninjured, and new bone is rapidly and accurately formed.

REFERENCES.—¹*Surg. Gyn. and Obst.* 1915, i, 129; ²*Ibid.* ii, 306.

OTITIS MEDIA.

J. S. Fraser, M.B., F.R.C.S.

Arthur H. Cheate¹ states that in infancy, with the exception of the mastoid antrum and a layer of small cells in the outer wall of this cavity (mural cells), the mastoid process contains no cells, the bone being diploetic. (1) This infantile type of mastoid persists throughout life in about 15 per cent of people. (2) The second type is the cellular or pneumatic mastoid. In this the diploe has been replaced by air-spaces which have extended from the middle-ear tract. This cellular development begins in early childhood, and by the twenties it is completed.

1. A middle-ear infection in the acellular type of mastoid may have the following results: (a) If drainage be free and if the virulence of the infection be slight, cure may occur. (b) If the infection be virulent, the lining membrane of the antrum is destroyed and the bony walls are affected. The ossicular chain is more or less destroyed and the suppuration becomes chronic with formation of granulations, polypi, cholesteatoma, etc. (c) A labyrinthine or intracranial complication may develop at the time of the original infection or later.

According to the old teaching, the dense bone which is found to surround the antrum in operating on cases of chronic middle-ear suppuration was thought to be due to a sclerosis of the bone from the irritation of long-standing suppuration. Cheate's researches have shown that this dense area is due to a developmental process. The dense bone is not the effect of chronic suppuration, but the cause of it. It is, however, possible that a slight amount of sclerosis of the

bone, limited to the walls of the antrum, may be due to the effects of chronic middle-ear suppuration.

2. In acute infections of a cellular temporal bone, the sepsis readily travels from the antrum to the cells, where it sets up an acute mastoiditis with the usual external signs. The distance to which the disease may extend is limited only by the extent of the air-cells.

Between the typical infantile or diploetic mastoid and the typical pneumatic mastoid there are several varieties of bone. In these transitional types the mastoid has been more or less transformed into cells with dense walls, the outer antral wall remaining dense. When infection occurs, these bones behave like the infantile type. Asymmetry between the right and left temporal bones is present to a marked extent in only 7 per cent of specimens. There is no means of judging by an external examination whether a mastoid is cellular or infantile.

Exanthematic Otitis.—Borden² states that in scarlet fever there is a striking lack of immunity against streptococcal infection. General infections, such as septic endocarditis, septicæmia, and phlebitis, are common in severe attacks, and local infections of the ear, nose, and throat are frequently met with. The lack of immunity to streptococcal infection does not cease with the active symptoms of the disease, but extends well into convalescence, during which a considerable number of cases of aural infection and mastoiditis occur. Borden remarks on the beneficial influence of paracentesis or spontaneous rupture of the drumhead upon the general condition of a child that is seriously ill, even on the condition of the heart, lungs, kidneys, and joints. The interior of the mastoid cavity may be filled with pus, without the ordinary symptoms of mastoiditis being present, e.g., œdema over the mastoid or displacement of the auricle. These are late symptoms, and usually only occur after the mastoid cortex has been perforated. Temperature amounts to absolutely nothing as a diagnostic point, and tenderness over the mastoid is of value only when present. Its absence does not mean the absence of mastoiditis. If, in a severe case of scarlatina with septicæmia or acute nephritis, the middle ear becomes infected, we must also suspect the presence of mastoiditis, and must not hesitate to operate. The application of an ice-bag may mask important symptoms. Borden states that it may seem foolhardy to give an anæsthetic to a patient suffering from pneumonia or nephritis, but he has never known any harm to result. One patient had double mastoiditis, general septicæmia, pneumonia, and almost complete suppression of urine, and yet, as the result of operation under general anæsthesia, all these complications subsided and the patient recovered. With regard to the infectivity of nasal and aural discharge in patients convalescent from scarlatina, Borden believes that both may give rise to severe return cases.

Kerley, in discussing Borden's paper, said that the general practitioner was usually blamed for not recognizing acute ear disease in the exanthemata: but the fault really lay with the otologist, who

taught that in acute otitis in children there were evidences of pain, such as head-rolling, ear-tugging, ear-boring, crying, etc. In infants, at any rate, such evidences of pain were unusual. In a fever case when a temperature continued after the usual period, it was very possible that the ears were involved. The ears, as well as the heart and lungs, should be examined daily. Eagleton advised the examination of the ears of patients on admission; if the drumhead was red, and if this continued for two or three days, a paracentesis was performed. This again was followed by profuse serous discharge for a few days, and then by cure. On this line of treatment they had no mastoids and no chronic running ears. Borden held that since they had been removing adenoids from the poor children of the city, the number of mastoid cases had materially decreased. He had noticed the virulence of infection in children coming from institutions. These cases all had a very poor vitality. If a case was watched daily, and the perforation was found to be growing steadily larger, the mastoid operation was called for.

Dyscrasic Acute Otitis.—Oscar Beck³ holds that certain general diseases, e.g., tubercle, syphilis, and leukæmia, greatly alter the symptoms and appearances in cases of acute otitis. In recent cases of syphilis, one finds a unilateral middle ear affection together with disease of the mucosa of the nasopharynx, around the orifice of the Eustachian tube on the same side. The same holds good of tertiary affections. Even in cases in which the pharynx appears healthy, a middle-ear inflammation is probably due to infection by way of the tube, and not by the blood-stream. Beck calls attention to the fact that otitis media in syphilitic cases is almost painless. The patients complain of a 'woolly' feeling in the head, and of marked deafness.

Advanced Tympanic Deafness.—Kerrison⁴ calls attention to our very unsatisfactory treatment of deafness associated with intratympanic fixation of the ossicles, even apart from otosclerosis. He states that fixation of the stapes may be primary or secondary: primary when due to morbid changes which bind the ossicles directly to the margins of the oval window or niche; secondary when the stapes is immobilized through fixation of the malleus, or incus, or both. The type of deafness does not vary materially with the particular section of the ossicular chain which is bound, but the primary cases of stapes fixation are less amenable to treatment than the secondary. The following tympanic conditions not infrequently lead to ossicular rigidity: (1) Marked thickening of the tubo-tympanic mucosa due to prolonged subacute exudative inflammation; (2) Permanent contraction of the tensor tympani muscle; (3) Presence of adhesive bands between the stapes and the walls of the oval niche.

Kerrison believes that a negative Rinné (bone-conduction greater than air-conduction) in any case of deafness should be regarded as evidence of stapedia fixation. He thinks that the routine use of the catheter as a means of correcting ossicular rigidity is based on a false conception of the mechanism involved. The first few inflations often

result in the breaking, or at least modifying, of small adhesions, with consequent improvement in hearing. If continued, the force of the inflations is exerted more and more in the direction of stretching the drum membrane, while exerting less influence on the ossicular chain. Used too frequently or too forcibly, the result is a disturbance of the tone or balance of the sound-conducting mechanism. Two time-honoured superstitions should be disposed of. The first is that the passage of a current of air through the tube exerts any permanent therapeutic influence on a chronically diseased tube, and the second is that the use of medicated vapours, e.g., menthol or iodine, exerts any beneficial action on the mucosa. Eustachian bougies simply exert pressure, and the effect is only temporary. Kerrison believes in the local application of argyrol or silver nitrate in chronic tubal lesions. Yankauer's method of first cocainizing the tube and then directly applying a 25 or 50 per cent solution of **Argyrol** gives the best results. If in a case of advanced tympanic deafness the first inflation is followed by an appreciable improvement in hearing, the ears should be inflated at short intervals until the maximum gain has been obtained—usually the third or fourth inflation.

Eustachian Curettage.—Yankauer,⁵ who was probably the first to curette the Eustachian tube through the external auditory meatus, has collected the results of this method of treatment. He wrote to 6000 otologists and received 2000 replies, but only found 119 who had performed the operation. The total number of cases collected was 735. Of these, the tube was successfully closed, after one or more curettings, in 609 (83 per cent). However, only 379 patients were reported as cured (51.5 per cent). The claim is therefore made that more than one half of all cases of chronic suppuration in the middle ear have been cured by curetting the Eustachian tube through the external auditory meatus. According to Yankauer, such closure of the tube means that the perforation of the drum will never close, but this is a matter of no importance. His method should never be employed in the presence of an acute exacerbation of the middle-ear suppuration, or when labyrinthine or intracranial complication is present. He records one case operated on by another surgeon, in which death occurred following a severe hæmorrhage from the ear, fourteen days after the tube had been curetted. He believes that it is possible for any otologist to close the tube after the first curetting, in practically all cases. Yankauer does not fear the danger of injuring the internal carotid artery. With regard to the effect on the hearing, this was improved in 46 per cent and only made worse in 4 per cent. In the same way, tinnitus was lessened in 53 per cent of cases and only increased in 5 per cent. Yankauer holds that his method of curetting the tube can be carried out under local anæsthesia in dispensary practice, and that only those cases which do not heal should be submitted to the radical mastoid operation. [There is no doubt that this question of suppuration in the Eustachian tube is a very important one. 'Tuborrhœa' is responsible for a large number of

cases of chronic (mucopurulent) discharge from the ear, but in the abstractor's experience they are not dangerous and do not lead to intracranial complication. They are, however, annoying to the patient, and extremely difficult to cure. It is further worthy of note that in the majority of these cases the hearing is fairly good, as the niches of the oval and round windows are in a more or less healthy condition. The writer, however, cannot agree with Yankauer that the closure of the tube is an easy matter. On cross section the Eustachian tube is quadrilateral, and Yankauer's curettes, which are circular, are very badly adapted for the purpose for which they were intended. The specimens which the abstractor has seen were, moreover, much too small. He has found that even when the Eustachian tube is curetted as part of the radical mastoid operation, i.e., with the patient under a general anæsthetic, with the aid of Alexander's Eustachian curettes, which are correctly shaped, and when the procedure is guided by direct vision, it is by no means always possible to close the Eustachian tube, whether or not chromic acid be applied after the tube has been thoroughly scraped. We find it difficult to believe that otologists can efficiently curette and close the tube at a first attempt, if they use (1) only a local anæsthetic, (2) an inefficient instrument, and (3) if they operate round a corner by feel or guesswork, and not aided by direct vision.—J. S. F.]

Eustachian Massage.—Mink⁶ states that Politzer years ago recommended massage of the Eustachian tube by stroking with the finger in a downward and forward direction between the mastoid process and the ascending ramus of the lower jaw. Mink, however, holds that the Eustachian tube is too deeply placed to be accessible to massage from the surface.

To massage the region of the retronasal sulcus, Mink uses his nasal brush, which consists of 20 cm. of silver or copper wire, 1 mm. thick. The distal end of the wire is roughened for the application of cotton-wool, and bent to the curve of a Eustachian catheter, while the proximal end is bent back to form a rough handle. The brush is impregnated with 5 per cent cocaine and then introduced into the nasopharynx after the manner of a catheter. The cotton-tipped end is then turned outwards into the fossa of Rosenmüller, and the brush drawn forward over the inner lip of the tube into the retronasal sulcus. The movement of massage consists in a turning of the brush and a forward movement frequently repeated. One soon learns to give the brush the curve most suitable for each patient, always remembering that the more the distal end is bent, the greater is the pressure exerted. Unless the conformation of the nasal cavities is very abnormal the proceeding should be painless. Glycerin may be used instead of cocaine if the instrument can be easily passed through the nose. Slight pain and passing nasal obstruction are the only unpleasant consequences of the treatment. In order to become efficient in the procedure, Mink suggests that the otologist should practise on himself. At each sitting twenty slow effleurage movements should be carried

out. The sittings should be repeated daily if possible. One must not be afraid of a little blood on the mop or of a slight increase in nasal secretion. At the end of each sitting Mink applies a drop or two of iodine in glycerin. Mink gives no detailed account of the results obtained from his treatment, but states that it did good in inveterate cases.

Mastoiditis.—Kyle⁷ states that there is remarkable indifference both among physicians and the laity to the danger of a discharging ear. The time to operate in a case of acute mastoiditis is as soon as the diagnosis is established. Tenderness is a valuable sign, but may be absent even when the mastoid cells are full of pus. The two most reliable signs are pulsating discharge from the middle ear and fever. The value of the Röntgen rays in the hands of an expert is beyond dispute as an aid in determining any involvement of the mastoid cells. For comparison it is necessary to take a picture of both sides. The writer claims that the *x* rays will show a mastoid going on to spontaneous recovery, with exudation remaining in the cells, and a commencing sclerosis of the cell wall.

Indications for Mastoid Operations.—Welty⁸ apparently agrees with Politzer that operation should never be performed on a single indication. If, however, during the course of an acute mastoiditis, there is an increase in pain, temperature, or tenderness, with an increase in the bulging of the meatal wall and a diminution in the leucocyte count, operation is the safest procedure. Welty does not believe in a second incision of the drumhead in such cases. If, at the end of three weeks after the onset of an acute otitis, pulsation of the pus in the meatus be still present, the mastoid operation should be performed. Welty also believes that an acute discharge from the ear should not be allowed to continue for more than six or eight weeks without operation, as the hearing is likely to become more and more impaired.

Secondary Suture after Simple Resection of the Mastoid Process.—Holger Mygind⁹ cures away all soft granulations in the bone cavity, mops it out with iodoform gauze, and permits it to fill with blood. The edges of the skin wound are then undercut and brought together by Michel's clamps. The method is a modification of the blood-clot dressing, and is suitable only in cases which are free from any complication. Ideal healing occurs in about half the cases. The method can be adopted in from eight to twenty days after the original operation.

Mastoid Grafting.—Dan McKenzie¹⁰ practises immediate grafting after performing the radical mastoid operation, on the lines laid down by Ballance, and holds that there is no doubt that it shortens convalescence. (He uses the Thiersch graft, and not the entire thickness of the skin.) He does not recall a case in which sepsis was to be attributed to the graft. After the graft has been accurately opposed to the bony walls of the cavity, McKenzie allows the cavity to fill with blood, and finds that the coagulum retains the graft in position perfectly, and that packing is therefore unnecessary. It is, however,

necessary to see that bleeding is not occurring under the graft. At subsequent dressings the blood clot is left undisturbed, but it begins to disintegrate four or five days after the operation.

Allport and Rochester¹¹ state that the chief objections to the radical mastoid operation are: (1) Painful dressings; (2) Tedious healing; (3) Failure to cure the suppuration; (4) The poorly nourished epithelium lining the cavity is liable to scab-formation; (5) Failure to close the tympanic end of the Eustachian tube; (6) Depreciated hearing owing to the formation of cicatricial tissue in the region of the windows. They believe that many of these disadvantages can be got rid of by skin-grafting. The technique is as follows: At the end of the radical mastoid operation all bleeding must be stopped by the application of peroxide of hydrogen, followed by syringing with hot saline lotion. The cavity is now plugged with sterile gauze. Large thin grafts are cut and floated on to a glass slide, and are thus transferred to the radical mastoid cavity, from which the packing has been removed. Care must be taken that the grafts do not curl up unduly at the edges. To prevent this the skin of the thigh should be varnished with 'new skin' before the graft is cut. A portion of the graft should be firmly tucked into the Eustachian tube, but the slight overlapping of the grafts is harmless. As large a portion as possible of the tympanum, attic, and antrum should be covered. The writers advocate the covering of the grafts with a kind of oiled silk. Finally, they call attention to the absolute necessity of treatment at regular intervals after the radical mastoid operation. Even when completely healed, the cavity should be syringed out once a week, and a 2 per cent solution of salicylic acid in alcohol freely poured into the ear.

The End Results of the Radical Mastoid Operation.—MacCuen Smith¹² has only operated on cases that have utterly failed to respond to persistent non-operative treatment and on urgent cases. In a large percentage of these chronic cases the middle fossa is unusually low, and the sinus in some instances far forward; hence a radiogram is of advantage. Complete cessation of all discharge is obtained in about 80 per cent of cases treated as hospital out-patients, while in private work the percentage is 90, or better. The time of repair is lessened materially by the use of skin-grafting.

Pharyngeal Drainage of Cranial Suppuration of Otitic Origin.—Jacques¹³ regards retropharyngeal abscess secondary to suppurative otitis as of critical importance. He records three cases, all of them due to acute middle-ear suppuration. The symptoms were fever, sub-occipital pain and swelling, torticollis, and dysphagia. Retropharyngeal abscess may develop in two ways: (1) Directly, along the petrous bone from the tympanum; (2) Indirectly. In this latter form a collection of pus occurs under the occiput, deep to the digastric muscle, reaching that region from an extradural abscess of the cerebellar fossa. From this point in most cases the pus tends to infiltrate posteriorly towards the back of the neck, but in a few cases a weak-

ness of the aponeurotic barriers, due to the passage through them of a vein, permits the pus to gravitate towards the pharynx. Jacques suggests that an effort should be made to guide the pus towards the pharynx by raising the periosteum from the inferior aspect of the occiput, after resecting the apex of the mastoid and ligaturing the occipital artery. He admitted that retropharyngeal abscess was sometimes due to jugular phlebitis, and sometimes to osteitis of the atlas or axis. Both of these conditions had to be excluded.

Injury of the Sigmoid Sinus in Mastoidectomy.—Scruton¹⁴ says the danger of septic thrombosis following operative injury of the sigmoid sinus is usually considered slight. He has seen twelve accidental penetrations of the sinus, none of which developed a septic thrombosis. The hæmorrhage was controlled by a plug of iodoform gauze. Bondy has reported a case in which puncture of the sinus with a diagnostic needle resulted in operation for septic thrombosis nine days later; and Page has recorded profuse hæmorrhage from the ear immediately after paracentesis in an infant, followed by jugular thrombosis. The child recovered after operation. Scruton records four cases on which he has operated himself. He states that clot formation only occurs when the intima of a vessel is stimulated and fibrin ferment liberated by toxic, inflammatory, or traumatic irritation. Accidental injury of the sinus is of no great consequence unless infection gains entrance to the protective clot, which then undergoes dissolution, throwing toxins and living bacteria into the circulation. Most cases of injury of the sinus do not result in septic thrombosis, because the sudden rush of blood carries away the contamination.

Vaccines.—Wilfred Haughey¹⁵ considers that the use of stock vaccines is discredited, but that extreme care is necessary in the making of autogenous vaccines. Local treatment should be kept up in conjunction with the vaccine. Haughey confirms Dabney's opinion that the general condition of the patient improves as the result of vaccines. He reports (1) Six cases of subacute purulent otitis media, all of which were cured; (2) Six cases of chronic middle-ear suppuration which were not so successful; (3) Four cases classed as mastoiditis, in three of which cures were apparently obtained. Vaccines appear to be specially useful in subacute cases, in which 78 per cent of cures are obtained. In chronic cases, on the other hand, only 28 per cent are cured. He admits that many of the cases would have got well without a vaccine.

INTRACRANIAL COMPLICATIONS OF OTITIS MEDIA.

Otitic Cerebellar Abscess.—In Milligan's¹⁶ experience, cerebellar is almost three times as common as cerebral abscess; males are affected twice as often as females; cerebellar abscess is twice as frequent upon the left side as upon the right. In cases of acute otitis media and mastoiditis, there is first of all an extradural abscess in the posterior fossa, or a thrombosis of the sigmoid sinus with secondary infection of the cerebellum. In chronic cases, on the other hand, cerebellar abscess

is usually secondary to labyrinth suppuration, though sinus thrombosis and extradural abscess are not infrequently associated with it.

A cerebellar abscess is usually found well forward in the lateral lobe of the cerebellum. Hence the ideal surgical approach is through the posterior wall of the petrous portion of the temporal bone in the space between the sigmoid sinus and the internal auditory meatus. Exploration along this route is much more likely to be the means of discovering an abscess than exploration behind the sinus groove. Prior to any exploration, Milligan is in favour of withdrawing a few drachms of cerebrospinal fluid by lumbar puncture, in order to obviate the risk of stoppage of respiration—an urgent danger in cerebellar abscess. In three of Milligan's twenty-seven cases, operation was successfully completed while artificial respiration was kept up.

One of the difficult problems is the maintenance of free drainage—especially in chronic cases where one has to deal with a more or less resistant pyogenic membrane. If retention occurs, pressure symptoms reassert themselves. Milligan has found a counter-opening behind the sigmoid sinus of great service. He inserts a small rubber drainage tube through the opening made in the posterior antral wall, and a double silver tube through the posterior opening.

Milligan admits that the results following operative interference in cases of cerebellar abscess still leave much to be desired. This is not surprising if we remember what a large percentage of cases are complicated by the presence of sinus thrombosis or meningitis. Milligan's results during the last ten years are as follows: Cases operated on, 27; males 17, females 10; right side 7, left 20; cured 17, died 10.

Ocular Symptoms of Brain Abscess and Sinus Thrombosis.—Jobson¹⁷ holds that the absence of ocular symptoms does not justify the exclusion of intracranial involvement, but nevertheless considers that they are of great value. Some ophthalmic surgeons hold that the changes in the optic disc are due to increased intracranial pressure which projects the cerebrospinal fluid into the intervaginal space, and so constricts and strangulates the nerve and vessels; œdema of the papilla is the result. The holders of this view, further, point to the rapid subsidence produced by a decompression operation. Others believe that choked disc and optic neuritis are inflammatory, and that they are produced by metabolic substances projected into the cerebrospinal fluid of the intervaginal space. Recently these two theories have been combined.

In cases of brain abscess there are three stages: (1) The inflammatory or febrile stage, when the affected patch in the brain is in the stage of red softening and the symptoms are those of irritation. This stage lasts from a few days to a week, and is usually preceded by stoppage of aural discharge. There is no optic neuritis, and the pupils react normally. (2) The manifest or early purulent stage. The symptoms are due to pressure: there is lowering of both the mental and physical functions. Optic neuritis develops and advances rapidly. It is usually more apparent on the diseased side. Choked disc is more

often seen in cerebellar abscess than optic neuritis. The pupils are sluggish. (3) The terminal or paralytic stage is one of increased pressure combined with great toxæmia, and is associated with coma and sometimes with convulsions. Optic neuritis may be intense, and the pupils are quite insensitive to light. If the pupils are unequal, the abscess will probably be found on the side of the more widely dilated one. Pupils contracted and insensitive to light indicate that the disease is in an advanced stage. Jobson states that optic neuritis requires at least ten days for its development. Its absence does not negative cerebral abscess. Its value as a symptom is that if present only on one side, or more marked on one side, that side is probably the seat of the lesion. This rule, however, is not absolute. When the abscess is situated beneath the tentorium, choked disc is more frequent and severe than when it is located in the cerebrum.

Eye changes occur in about two-thirds of the cases of otitic sinus thrombosis. If the thrombus extend to the cavernus sinus, the eyeball on the affected side will be chemosed and proptosed, the pupil dilated and fixed, and the cornea dry and hazy. The lids of the affected side become œdematous.

Otitic Meningitis.—Holger Mygind¹⁸ points out that *lumbar puncture* is the only certain means of diagnosing purulent lepto-meningitis, as extradural abscess, sinus thrombosis, and abscess of the brain may give rise to symptoms similar to those of meningitis. Some otologists maintain that one can only speak of meningitis when bacteria are present in the cerebrospinal fluid, in addition to white blood-corpuscles. Mygind does not agree with this view, as in his experience a fatal diffuse purulent meningitis may be present without our being able to find bacteria by the methods generally adopted. This observation is confirmed by post-mortem examination. In every diffuse purulent leptomeningitis there are certain stages. At first the cerebrospinal fluid is clear, and then becomes slightly cloudy, before being definitely purulent. The writer holds that, normally, the cerebrospinal fluid, at least at the first tap, is 'crystal clear,' and that even the slightest cloudiness is abnormal. Later the fluid may have a red or yellow colour due to hæmorrhage caused by the first tap. In the majority of acute cases of otitic meningitis, a blood-count shows that the polynuclear leucocytes are in the majority, but even in acute cases the mononuclears may be the more numerous.

Prognosis.—This in cases of otitic leptomeningitis is very difficult. An apparently mild case operated on early has a fatal termination, while a severe purulent case in a child results in spontaneous recovery. The prognosis, however, in children under 5 years, is very bad. Mygind found that between the ages of 15 and 30 years more than half his cases recovered, but in patients over 30 he had no cures. Meningitis due to chronic middle-ear suppuration is less favourable than that due to acute, while meningitis accompanied by labyrinthitis is of a specially bad omen. Mygind finds that the more purulent the cerebrospinal fluid, the less favourable is the prognosis. Cases in

which the polymorphs are in the majority in the cerebrospinal fluid are less favourable than those with excess of mononuclears, or with a nearly equal number of the two kinds. The cerebrospinal fluid was sterile in 24 cases, and of these 9 (37.5 per cent) recovered. In 37 cases organisms were found in the fluid, and of these only 5 (14 per cent) recovered. Mygind finds that the streptococci give the worst, and the pneumococci the best, prognosis. If the pulse is irregular and slow it is an unfavourable sign. Rapid progress of the symptoms is of bad omen, while paralysis and coma are, of course, fatal signs. On the other hand, choked disc and optic neuritis are of good omen. Cases complicated by brain abscess are very unfavourable, while 33 per cent of those associated with sinus thrombosis recover.

TREATMENT.—**Hexamine** (urotropine) may do good in some cases, but may, on the other hand, cause irritation of the kidneys. Mygind has no experience of vaccine treatment, and does not obtain cures from lumbar puncture alone. Three methods, or rather degrees, of **Operation** have been advocated: (1) The primary focus in the middle ear is cleared out, and the labyrinth opened and drained if necessary; (2) The dura mater is freely exposed in addition to the above; (3) The dura is incised in addition to (1) and (2). As yet we cannot say with certainty which of these methods is best. In any case it is advisable to operate as early as possible after the patient has been thoroughly examined. Mygind compares the rapidly fatal cases of meningitis to an explosion, but states that frequently, before the explosion, fire has been burning for a time, i.e., a suppurative focus in the middle ear or labyrinth. He holds that even in cases of acute middle-ear suppuration, the radical mastoid operation should be performed if meningitis be present. After the middle ear and labyrinth have been investigated, the sinus region should be opened up, as sinus infection is often the connecting link between the original middle-ear suppuration and the meningitis. Mygind exposes the whole of the vertical portion of the sigmoid sinus in all cases. He states that in some instances meningitis begins with a rigor, although there is no thrombophlebitis of the sinus. He proof-punctures the sinus in three places with a hypodermic syringe, and frequently obtains fluid blood from the region of the upper knee, while below this he gets no blood or even obtains pus, thus showing that thrombosis has occurred in the lower portion. In the latter case he opens the sinus and removes the outer wall with scissors. He then follows up the thrombus as far as it extends, but only ligatures the jugular if he finds pus in the sinus. Mygind next exposes the dura of the middle cranial fossa with the aid of bone-forceps, but only lays bare the dura of the posterior fossa if he performs a labyrinth operation or suspects a cerebellar abscess. The operator must next make up his mind whether the dura mater is to be opened or not. Formerly Mygind split the dura to obtain drainage, but found that in many cases the brain prolapsed and blocked the opening, so that more recently he has avoided opening the dura. In 31 of his cases the

dura was incised, with 6 recoveries, while in the remaining 30 the dura was not incised, and 7 recovered. Mygind gives the following indications for the incision of the dura: (1) Fistula of the dura: such cases usually have internal pachymeningitis, superficial brain abscess, or necrotic encephalitis; (2) Gangrene of the dura; (3) External pachymeningitis which extends deeply; (4) Cases which show signs of abscess of the cerebrum or cerebellum.

Kopetzky¹⁹ takes a more gloomy view of the operative treatment of meningitis. In his experience, patients all die suddenly as if overwhelmed—a manner of death significant of inflammation of the brain tissue. The vital centres are prevented from continuing their functional activity. In discussing Kopetzky's paper, Day stated that Cushing's theories—that death is caused by pressure and that if the pressure is eliminated the disease can be overcome—had been quite overthrown. The place where the maximum amount of pus is found post mortem is just behind the optic chiasma—a region in which the circulation appeared to be very sluggish. This space cannot be drained. In some cases the disease ran a typical septic course, the patient going off into coma, as in advanced typhoid, with muscular relaxation, loss of control of sphincters, and dilatation of the pupils.

REFERENCES.—¹*Guide to Otological Specimens, Museum R.C.S. England, 1915*; ²*Ann. Otol. Rhinol. and Laryngol.* xxiv, No. 1; ³*Zeits. f. Ohrenheilk.* lxxiii, 97; ⁴*Jour. Amer. Med. Assoc.* 1915, i, 109; ⁵*Laryngoscope*, 1915, 675; ⁶*Zeits. f. Ohrenheilk.* lxxii, 165; ⁷*Jour. Amer. Med. Assoc.* 1915, ii, 496; ⁸*Ibid.* 504; ⁹*Jour. Laryngol. Rhinol. and Otol.* 1915, 322; ¹⁰*Ibid.* 346; ¹¹*Ann. Otol. Rhinol. and Laryngol.* 1915, June; ¹²*Laryngoscope*, 1915, 322; ¹³*Jour. Laryngol. Rhinol. and Otol.* 1915, 321; ¹⁴*Ibid.* 310; ¹⁵*Ann. Otol. Rhinol. and Laryngol.* 1915, Mar.; ¹⁶*Jour. Laryngol. Rhinol. and Otol.* 1915, 1; ¹⁷*Laryngoscope*, 1915, 7; ¹⁸*Zeits. f. Ohrenheilk.* lxxii, 73; ¹⁹*Jour. Laryngol. Rhinol. and Otol.* 1915, 448.

OTOSCLEROSIS.

J. S. Fraser, M.B., F.R.C.S.

Etiology.—Sohier Bryant,¹ New York, has made an exhaustive analysis of the views of the various writers on the subject of otosclerosis, and has added many of his own observations. Bryant strongly holds the opinion that otosclerosis is intimately associated with disorders of the ductless glands. He holds that otosclerosis may follow catarrhal or suppurative otitis media. He calls this the secondary form of otosclerosis. According to Bryant, most cases belong to this secondary type. The otosclerotic foci are symmetrical, and correspond to the terminations of the nutrient arteries of the pyramidal bone. Baginsky believes a nerve lesion is the primary factor in otosclerosis. In almost all cases examined microscopically, nerve changes were found in the inner ear. Siebenmann, however, believes that these may be secondary to the bone lesion. Lumbar puncture may ameliorate the symptoms of otosclerosis. The sclerosis produced by certain infections is limited to particular vascular areas, e.g., the sclerosis due to small-pox affects the pulmonary artery. It is suggested that certain infections may influence the pyramidal bone in a similar way. Habermann points out that in otosclerosis we have a

chronic inflammation extending to the bone from the periosteum, by way of the vessels, without suppuration or necrosis. The presence of hyperostosis and the porous appearance of the bone favour a syphilitic origin, but the Wassermann reaction is seldom positive.

TREATMENT.—In view of the opinions which associate dystrophic processes in bone (including otosclerosis) with disorders of the internal secretions (ductless glands), it would appear to be advisable to test the action of **Pituitary, Suprarenal and Ovarian Tablets**—alone or in combination—in cases of otosclerosis not too far advanced to make improvement impossible.

REFERENCE.—¹*Jour. Laryngol. Rhinol. and Otol.* 1915, 389.

OVARY, DISEASES OF. (*See also* SALPINGITIS.)

Bryden Glendining, M.S., F.R.C.S.

Wiener¹ studies the complications in 240 consecutive cases of *ovarian tumour* operated upon at Mount Sinai Hospital. It is of interest to note that torsion of the pedicle occurred in 12.26 per cent, rupture in 2 per cent, and infection in 2.2 per cent. Ovarian tumours complicated pregnancy in 11 cases, and in 9 the operation had no effect on the pregnancy; but in the remainder the result was a viable premature child in one instance and an abortion in the other. In 2 cases in which either both ovaries or the only corpus luteum present was excised, the patients did not abort, while in a third case, six weeks pregnant, in which the only corpus luteum was removed in the cyst wall, an abortion followed in fourteen days.

Tuffier² read an important paper before the Congress of American surgeons in London in July, 1914, dealing with his experience during the last eight years in the **Transplantation of Ovaries**. Grafts of one sort or another were employed in 204 cases, and are classified under three headings:—

1. Homo-transplantation (the ovary of one patient grafted into another) was performed twenty-four times without a single success; the failure he attributes to differences between the individuals, which induced hæmolytic or agglutinative changes and permitted absorption of the engrafted ovary by the leucocytes. The experiments of Carrel in the successful grafting of limbs when the host is infected offers a possible means of improving the technique, so that the engrafted ovary may no longer be treated as a foreign body by the host.

2. Heterografting was performed seven times, and was uniformly unsuccessful.

3. Autotransplantation (grafting the patient's ovary elsewhere in her own body) was performed 145 times, and these cases are divided into two distinct groups.

- a. Auto-transplantation with Hysterectomy.*—The uterus was removed and one of the removed ovaries grafted in 84 instances, and was uniformly successful in that the graft took, and the ovary enlarged mensually for two to three years; but Tuffier is of opinion that the patients derived no benefit from it, and in these cases of hysterectomy it is useless to graft an ovary.

b. Auto-transplantation without Hysterectomy.—It is in these cases only that benefit is to be expected from transplantation of ovaries. This was done in 65 cases, using the following technique: The ovary should preferably be grafted in the extraperitoneal fat beneath the rectus muscle, in a dry prepared bed. When sclerosed or torn, the ovaries should be opened and cysts removed. Often it is advisable to cut the gland in small pieces, so that greater surface is presented to the body for vascularization.

The results under the group of autotransplantation without hysterectomy are: (i) Clinically, the ovary appears to lie dormant for three to four months, sometimes presenting a little tenderness, and the patient shows menopausal symptoms; but later the gland becomes active, enlarges, and even becomes painful for five or six days, whereupon symptoms subside and menstruation reappears and the menopausal manifestations sink into abeyance. Of 37 cases, seen one to six years after operation, 32 had regular periods, and in the remaining 5 cases either the patients were over forty years of age or the grafts had been dropped into tinct. iodi because of the septic character of the ovarian inflammation. In some cases, however, the periods are irregular, and in others the menopause subsequently appeared one to three years later. If menstruation should appear within two months of operation, it may be taken that a portion of the ovary was left behind. (ii) Anatomically, the successful grafting in a few instances was corroborated by finding two to three years after operation in one case a corpus luteum, in another a blood-cyst from a corpus luteum, and in a third instance, a follicular cyst. (iii) Physiologically, he deduces that monthly ovulation cannot prevent menopausal symptoms, because if menstruation does not appear although the ovary may enlarge each month, yet climacteric phenomena are encountered. It is therefore probable that ovulation and the internal secretion of the ovary are not so important as generally believed, and Tuffier attributes the real cause of the symptoms to absence of menstruation. From this, he would formulate a new theory of menstruation, to the effect that there is a chemical substance created every month which in sufficient quantity acts upon the ovary and modifies its internal secretion, and that this modified internal secretion induces the menstrual flow and is eliminated with the blood. Two experiments show its presence in the serum: when blood from a woman about to menstruate is injected into a woman in the intermenstrual period, it induces a flow forthwith; secondly, menstruation can be produced by injecting defibrinated blood.

In conclusion, it would appear that Tuffier regards auto-transplantation of value only as when the uterus is present, and that the uterus plays an important part in the internal economy of the body; at the same time it is doubtful whether sufficient evidence has been adduced in support of his views.

REFERENCES.—¹*Amer. Jour. Obst.* 1915, ii, 209; ²*Surg. Gyn. and Obst.* 1915, i, 30.

OZÆNA. (*See* NOSE, DISEASES OF.)

PALMAR ERUPTIONS.

E. Graham Little, M.D., F.R.C.P.

Sutton¹ gives a useful grouping of various diseases which may affect the palm, a part in which chronic disease is frequently met with. Perhaps the differentiation has most often to be made between syphilis and eczema, but as part of a wider distribution the palms are fairly often affected in psoriasis, seborrhœic eczema, ichthyosis, cheiropompholyx, and in some rarer diseases, such as eczematoid ringworm, pityriasis rubra pilaris, and tylosis. Granuloma pyogenicum and dermatitis repens are forms of disease which are certainly rare in English experience, but apparently Sutton sees them more frequently, and gives good illustrations of the clinical and histological appearances. The latter condition is best treated by trimming away the undermined edge of the ulcer, when a mixture of salicylic acid 2 parts, tannic acid 10 parts, and alcohol 88 parts, is applied several times daily. **Autogenous Vaccines** are also valuable in this affection. For granuloma pyogenicum a preliminary paring of the warty mass is followed by deep freezing with **Carbon Dioxide**, after which the site is painted with **Tinct. Iodi** and dressed with **Thymol Iodide**.

In actively inflamed eczematous lesions, soothing applications such as **Carbolized Calamine Lotion** and **Zinc Oil** should be employed at first, to be followed, if necessary, by the use of local stimulants (particularly those containing tar). Soap and water are to be avoided. In chronic eczema of the palms, recourse must often be had to the more powerful keratolytics and reducing agents. Of the various chemical keratolytics, **Salicylic Acid** (in strengths of from 5 to 20 per cent) is one of the most efficient and reliable. It may be advantageously prescribed alone or combined with green soap, in the form of a plaster or in an ointment. Of the commoner tar preparations, **Oleum Rusci** (oil of white birch) is superior to oleum cadini (oil of cade). It is best employed in ointment mixtures, and in strengths of from 8 to 20 per cent. **Radiotherapy** often proves valuable in combating this type of the disease, and if the affected areas are not too large, **radium** also may be employed with benefit.

Syphilitic eruptions of the palm generally require very little local treatment, although the liberal employment of a **Calomel** (10 per cent) or **Ammoniated Mercury** (10 per cent) ointment will hasten their disappearance.

REFERENCE.—¹*Jour. Amer. Med. Assoc.* 1915, ii, 407.

PANCREAS, DISEASES OF.

O. C. Gruner, M.D.

Diagnosis of Efficiency.—Einhorn's procedure¹ for estimating the efficiency of the pancreas is very convenient. A duodenal tube is swallowed at night with a glass of water. The patient calls on the physician at 9 a.m. before breakfast, when the tube is withdrawn, and the material analysed for ferment activity. Tubes are prepared containing respectively starch-agar, olive-oil-agar, and hæmoglobin-

agar : (1) Agar powder 2·5, starch 5, distilled water to 100 ; (2) Agar powder 2, olive oil 25, aqueous (1-2000) Nile-blue sulphate to 100 ; (3) Hæmoglobin powder 1, agar 2·5, water to 100. In each case the material is drawn up into tubing of 1·5 mm. bore, cooled, cut into 3-cm. lengths, and then coated with wax at each end for storage. One of each variety is placed in the duodenal fluid, after removing the paraffin from one end. A few drops of toluol are added, and the vessel is placed in the incubator for sixteen to twenty-four hours. If amylopsin be present, the agar column expelled from tube (1) will change colour with iodine. If steapsin be present, tube (2) will turn blue. If trypsin be present, a portion of the column will have dissolved. The lengths of column affected are measured in each case. The following table gives some of the results obtained by this method :—

	Amylopsin	Steapsin	Trypsin
Normal ..	4-8	2-5	·5-5 mm. affected
Hyperpancreatism ..	+	+	Excess
Hypopancreatism ..	+	+	Dim. (1 mm. or less)
Dyspancreatism ..	0	0	0
Heteropancreatism ..	±	±	±

	Normal Juice	PERCENTAGE OF CASES WHICH YIELD		
		Hyper- pancreatism	Hypo- pancreatism	Dys- pancreatism
Gastric ulcer ..	44·5	10·5	36	9
Duodenal ulcer ..	37·5	8	37·5	17
Achylia gastrica ..	16	0	0	84
Chronic pancreatitis ..	33·5	16·5	16·5	33·5
Cirrhosis of liver ..	43	14	0	43
Diabetes ..	66	17	0	17

REFERENCE.—¹*Med. Rec.* 1915, i, 967.

PANCREAS, SURGERY OF.

E. Wyllys Andrews, M.D., F.A.C.S. (Chicago).

Barker¹ presents a clinical study of seven cases of *acute pancreatitis*, five treated successfully by operation. After reviewing the classical work of Koerte, he emphasizes the fact that several different forms of the disease are now known to anatomists. Whether these are due to different types of bacterial infection or are different stages of a single process is not yet clearly proved. "We do know that there is a chronic pancreatitis lasting a long time without immediately threatening life, and presenting few, if any, marked symptoms until the organ is gravely compromised by interstitial fibrosis ; also that there is an acute inflammation of the organ associated with the escape

PLATE XXIX.

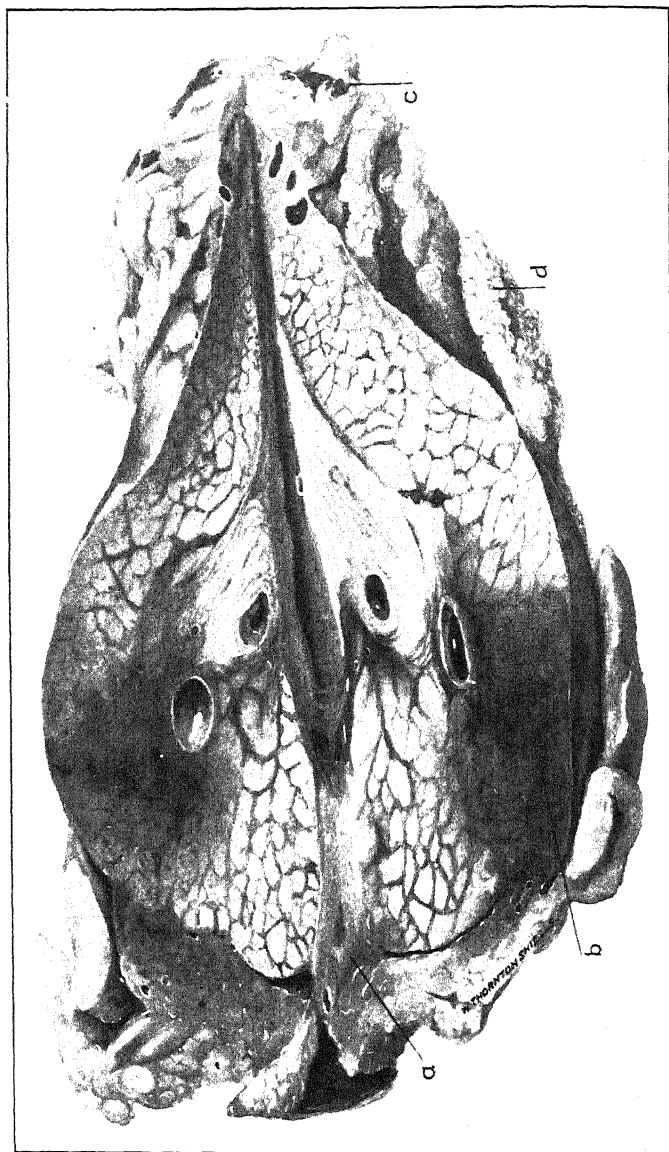
ACUTE HÆMORRHAGIC PANCREATITIS



A, Omentum showing fat necrosis stained green by Benda's copper method (the green stain comes out black in the illustration). B, Pancreas showing (a), hæmorrhagic patch; b, fat necrosis unstained.

PLATE XXV.

ACUTE HÆMORRHAGIC PANCREATITIS



Mr. Johnson's case, Feb. 23, 1914 (not operated on). *a*, Wirsing's duct inflamed in middle portion. *b*, Head of pancreas much swollen and hæmorrhagic. *c*, Fat necrosis stained green by Benda's copper method (the green stain comes out black in the illustration). *d*, Unaltered fat tissue.

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of much blood into its substance and around it (= acute hæmorrhagic pancreatitis); that there is a more localized suppurative form producing one or more distinct abscesses in the organ; and, finally, that there is a fulminating form in which, if the patient survive the severe shock of the onset, a very extensive and rapid sloughing of the organ and surrounding tissues gives a peculiar character to the process." The type of acute hæmorrhagic pancreatitis and that form in which there is fat necrosis, are already very well recognized. Langerhans appears to have been the first to point out that the change in the fat cells was due to the fat-splitting effect of the pancreatic secretion, after which the fatty acids combine with calcium to produce the white material which is so characteristic and which leads to the destruction of the cells. (*See Plates XXIX, XXX.*)

The onset of the attack in all these cases was strikingly sudden and severe, in the form of epigastric pain. On opening the abdomen, turbid peritoneal fluid was found in most of them. The character of the discharges coming from the inflamed gland was the only evidence of hæmorrhage in about half the instances. Six of the cases here reported are the only instances of acute pancreatitis in the London Hospital in the last five years. The writer also adds six from his own private practice. As the disease becomes better understood and is dealt with in earlier stages, better results may be expected from surgery.

Mayo² discusses cholecystitis without stones or jaundice in its relation to *chronic pancreatitis*. Chronic cholecystitis produces two types of gall-bladders: (1) Large, blue, distended gall-bladder, with thin, foul-smelling bile from colon infection. (2) The thick-walled whitish gall-bladder, also adherent, containing thick, tarry bile. It is uncertain in these infections how much pancreatic irritation has to do with the causation. Palpation and a certain amount of intuition enable the operator to determine the condition of the pancreas, and, as the writer insists, of most of the other abdominal organs. He states that he has for years practised in all laparotomies the examination of the entire contents of the abdomen with his gloved hand whenever it is opened for any purpose. He has been surprised to find how frequently the pancreas showed enlargement and induration, such as would have justified a diagnosis of chronic pancreatitis, if some disease of the biliary tract had not been the original lesion. Well-marked cases of chronic interlobular pancreatitis involve the head and often the entire pancreas, but these cases seldom appear except with chronic infection of the biliary tract. Robson and also Deaver are quoted by the writer as stating that even if chronic pancreatitis is present, the common duct is not necessarily compressed so as to cause jaundice. Eliminating all chances of error, there still remains a group of cases of a chronic type of cholecystitis without gall-stones and without jaundice, in which there is undoubted chronic interlobular pancreatitis. The writer insists that in these cases the gall-bladder should be removed if it shows evidences of chronic chole-

cystitis. It has been his experience that removal of the gall-bladder promptly relieves the symptoms; but that if it is merely drained, recurrence of the pancreatic trouble is certain.

Claridge and Blaxland³ report six cases of pancreatitis, all of which terminated fatally, four after operation and two undiagnosed. They consider that this disease is more serious than one would imagine from the literature, in which we find about 40 per cent of recoveries. These cases are reported *in extenso*, with the necropsy findings, and are a valuable contribution. Their pathology seems to emphasize the intimate anatomical association of the common bile-duct and the pancreatic duct, strengthening the view of modern pathologists. The writers' opinion is that this condition is caused by the entrance of bile or duodenal contents into the pancreatic duct.

REFERENCES.—¹*Lancet*, 1914, i, 1594; ²*Amer. Jour. Med. Sci.* 1915, i, 469; ³*Brit. Med. Jour.* 1914, ii, 1423.

PANCREATITIS, ACUTE HÆMORRHAGIC.

Robert Hutchison, M.D., F.R.C.P.

Eve,¹ in a Bradshaw Lecture reviewing this subject, points out that as regards etiology both experiment and clinical experience agree in attributing the chief rôle to stagnation of secretion in the ducts, followed by infection, both of these factors being usually induced by gall-stones, although other causes, such as duodenal ulcer, may also be operative. The disease is much commoner in the male sex: out of 295 cases, 63 per cent were in men and 37 per cent in women. The majority of cases occur between the ages of forty-five and sixty-five.

SYMPTOMS.—“These accord with the symptoms of the group of acute abdominal crises, and closely resemble those of perforation of gastric and duodenal ulcer, of the gall-bladder, or the appendix. Many cases have been mistaken for acute intestinal obstruction. The onset is sudden, with very severe pain in the epigastrium, persistent vomiting, usually constipation, tenderness, fullness, and resistance in the upper abdomen, and gradually increasing distention; the pulse is rapid and weak; the temperature lower than the pulse-rate, and not infrequently subnormal, with collapse.

“Körte, whose experience is probably unrivalled, says that the one symptom which gives the most probable insight into the condition is tenderness across the epigastrium and resistance over the pancreas. He adds that the most distinctive sign is epigastric peritonitis, with subsequent swelling in the left lumbar region. This was present in eighteen of his cases in which a diagnosis was possible.”

Out of forty cases analyzed by the lecturer, vomiting “was almost a constant symptom (80 per cent), and was often severe and incessant. Constipation existed in 25 per cent, and was only marked in five cases. Diarrhœa was present in three cases, but in one of these the symptoms had existed fourteen days.

Pain was almost constant, and in 50 per cent was situated in the

epigastrium or upper abdomen. In the other cases it was localized in the right hypochondrium, the right side of abdomen, or right iliac fossa; in others, on the left side or left iliac fossa. Tenderness had much the same distribution as the pain. Distention existed in half the cases. The most important fact resulting from this review of cases is that a swelling was only observed in seven (17·5 per cent)—twice in the right hypochondrium (in one of these being a distended gall-bladder), thrice on the right side of the abdomen or to the right of the umbilicus, once on the left side of the abdomen, and once below the umbilicus. It may be observed that when pus forms around the pancreas it develops a retroperitoneal collection and presents in the left flank, or passes through the gastrohepatic omentum and forms a left subphrenic abscess. Occasionally, as in a London Hospital case, it tracks retroperitoneally to the appendix region; a collection may also occur in the right kidney pouch, as it did in this case. Shivering was noted only twice. Jaundice was present in five cases (12·5 per cent). Cyanosis, sometimes spoken of as a characteristic sign, was only present twice; one was an acute case of twenty-four hours' duration, while in the other the symptoms had lasted fourteen days. Glycosuria was once noted, a trace of sugar being found in 1 of Dietrich's 16 cases. It existed in 8 of Körte's 44 cases. One patient of Körte developed diabetes one and a half years after extensive necrosis of the pancreas, and died eight years subsequent to the operations.

"The discovery of fat necrosis during the operation is often the first definite indication of the nature of the malady. Its presence is very constant, but it was absent in 2 of Dietrich's 16 cases, one of these being operated on after forty-eight hours, and subsequently subjected to a post-mortem examination. The other, also an acute case of hæmorrhagic pancreatitis, recovered after an operation performed twenty-four hours after the onset. Fat necrosis was stated to be absent in 4 of 27 consecutive London Hospital cases, and all were subacute. This sign was therefore absent in only 14 per cent of cases."

PROGNOSIS.—"The mortality following operations for acute pancreatitis is still 40 to 60 per cent; but Ebner reports that of 20 cases not operated on, only 2 recovered. In Dietrich's collection of 161 cases of various operators up to 1913, 98 died—a mortality of 61 per cent. These cases included 103 collected from literature by Körte in 1911. Körte's 34 personal cases, in which the pancreas was exposed, gave a mortality of 47 per cent (18 recovered and 16 died).

"During the five years 1908 to 1912 inclusive, 17 cases were operated on at the London Hospital, with 11 deaths, a mortality of 64·9 per cent, while the series of 17 cases during the same period reported on by Dietrich gave a mortality of 77 per cent. The prognosis depends mainly on the acuteness of the malady and the period when operation is performed. Ultra-acute cases usually die with collapse in twenty-four to seventy-two hours, and extensive necrosis of the pancreas may be found as early as the third or fourth day.

"Among the 6 London Hospital cases that recovered, 4 were definitely subacute, and one of them was not operated on till the fourteenth day of his illness; in this case and in another, there was no fat necrosis; but in the 2 remaining cases, operated on respectively on the second and fifth days, there was necrosis with sloughing.

"Körte's cases give a valuable indication of the effect of early treatment on the prognosis. The mortality in cases operated on in the first two weeks was 31 per cent; of those operated on during the first three or four weeks, 50 per cent; of those operated on in the fifth and sixth weeks, all died."

REFERENCE.—¹*Lancet*, 1915, i, 1.

PARALYTIC DEFORMITIES. (*Vol.* 1915, *p.* 439.)

PARAPLEGIA, SENILE.

J. Ramsay Hunt, M.D.

A slowly progressive weakness of the lower extremities is occasionally encountered in advanced life, and may depend upon a variety of pathological lesions: spinal, neural, muscular, and vascular. In some of these groups a functional or psychic factor is occasionally associated, and contributes to the motor disability. Allen Starr¹ outlines the clinical picture of senile paraplegia as follows:—

The individual becomes gradually more and more feeble, and notices first an increasing disability in walking, in going up stairs, or in standing for any length of time. This undue weariness goes on to an actual feebleness of movement, no longer compensated for by the use of canes or help, and finally results in a partial paralysis of movement, so that it is with difficulty that the patient moves from room to room or chair to chair, and finally becomes bedridden. In some cases the weakness is attended by a marked ataxia, the incoordination being more extreme than the actual weakness. In some cases pain is a very prominent symptom, felt either on motion only or on standing, although it may occur spontaneously, and is particularly severe after exertion and towards night. The pain is not infrequently attended by sensations of numbness and tingling, and is always attended by coldness of the feet and legs, and an objective coldness of the surface. Occasionally, however, burning pain has been complained of, even though the surface was felt to be cold. An atrophic condition of the muscles is quite natural in a feeble old person, but in these cases the atrophy is very often quite pronounced, and is attended by a loss of the mechanical excitability of the muscles to percussion and by loss of the tendon reflexes. The limbs, as a rule, are flabby, cold, and blue, showing that the vasomotor condition is below normal and the circulation sluggish; not infrequently œdema occurs when the patient is out of bed. Occasionally a loss of control of the sphincters occurs late in the course of the case, but this form of weakness is to be distinguished carefully from that due to local disturbances in the prostate gland in men. This distinction is important, as one might wrongly conclude, from the appearance

of some inability to control the bladder, that a spinal lesion was present.

Pain in the back and around the loins is a frequent accompaniment of senile paraplegia, and gives rise to much discomfort and distress, particularly at night, when it is liable to lead to insomnia. The mental state of discouragement consequent upon the gradually increasing feebleness is a point which is not to be overlooked. As a rule, there is no affection of the hands or arms, or of the back above the shoulders.

When these cases are studied simply with a view to ascertaining their pathological basis, it seems possible to distinguish between certain groups. First, there are those in which the primary disease lies in the muscles alone, and may be likened to a muscular dystrophy or atrophy. In another group of cases it is evident that there is an active degenerative neuritis present. Thirdly, there are cases in which it is evident that the spinal cord is the seat of the disease.

REFERENCE.—¹*Med. Rec.* 1915, i, 169.

PARATYPHOID FEVER. (See also TYPHOID FEVER.)

E. W. Goodall, M.D.

The differentiation of this disease from typhoid fever has been of comparatively recent date, and our epidemiological knowledge of it is scanty. Consequently, the carefully-worked-out epidemic, which occurred in the Boston State Hospital during the period from October 19 to December 1, 1910, and of which an account has been published by M. M. Canavan, Mary Gill-Noble, and E. E. Southard,¹ is of great interest. The Boston State Hospital is an institution for the insane, and at the time of the outbreak there were 475 patients and 143 staff. There were 30 cases of the disease in all, and of these 25 occurred amongst the staff and 5 amongst the patients. In his report, Canavan states that the outbreak was not recognized as paratyphoid at first, nor even as belonging to the typhoidal group of diseases. This seems to have been due to the extreme mildness of the first cases. The cause of the epidemic remains in doubt. Of the 30 cases, 28 occurred in the women's department. The first indication that the disease was of the nature of typhoid was obtained by the discovery of a positive Widal reaction (typhoid) in a female inmate who assisted in the serving-room of the nurses' quarters. From the blood, active motile organisms were recovered. One of the male inmates, who was an assistant in the preparation of food, and had for one of his duties the turning of the meat-machine, was found to have a temperature of 101°, and from his blood *B. paratyphosus A* was cultivated. The female inmate presented no signs of illness, and the report does not state whether she had been ill at any time prior to the outbreak. Suspicion was attached to meat. "Six months after the epidemic, organisms from the colon group and the paratyphoid group were isolated from chopped meat which had been sent to the pathological laboratory for the purpose of making culture media." But whether

the refrigerator and the meat in it were infected by either of the inmates mentioned above, and especially by the man, or whether those persons were infected by the meat, was not ascertained, or even if the meat was infected at all at the time of the outbreak. The ice supplied to the institution may also be regarded with suspicion, especially as it was habitually obtained from a pond for the contamination of which by manure there was opportunity. Other sources for the outbreak could be negated.

The most interesting and valuable part of the report is that which deals with the clinical aspects of the epidemic, because this is the portion most fully reported. Most of the cases were very mild, and several would not have been diagnosed but for the serum reaction. Two or three were somewhat severe, but none were fatal. In most cases the onset was rather sudden. The early symptoms were chills, sweating, and headache. In 22 cases which were observed particularly, there were no rose-spots as in typhoid; whether they were present in any of the remaining 8 was not known. In 3 cases there was a profuse papular eruption, coming out quickly and disappearing in less than forty-eight hours; and in 2 others there was an erythema of the face and neck lasting about the same time. Rarely was the spleen palpably enlarged. In most cases there was constipation. There was fever of from eleven days' to five weeks' duration. Complications were rare; one patient had lobar pneumonia, and another a severe acute parenchymatous nephritis. There were no instances of perforation or hæmorrhage.

A considerable number of blood-counts were made, both in cases of the fever and in cases inoculated against typhoid, and the following are the conclusions reached: (1) Leucocyte counts may prove to be of some service in differentiating paratyphoid from typhoid fever, since they show that the paratyphoid blood-picture remains within the normal range, (a) without tendency to hypoleucocytosis at any stage of the disease, and (b) without loss or drop in eosinophiles. (2) In interpreting this result it must be remembered that the epidemic from which these data were derived was one of mild paratyphoid fever (*B. paratyphosus* A). (3) The blood-cell picture after antityphoid vaccination remains within the normal range, with tendency to slight initial rise in leucocytes (one instance only of a slight drop in eosinophiles).

Of 60 persons well vaccinated against typhoid, one contracted paratyphoid six months after the vaccination. Of 11 incompletely vaccinated, one may have had typhoid—their dates of vaccination were lacking. Of 70 not vaccinated, 18 contracted paratyphoid. Canavan states regarding these facts that "possibly these findings indicate a degree of 'crossed' protection (typhoid vaccine against paratyphoid fever); but this is not absolute, and consequently paratyphoid vaccination is indicated in appropriate circumstances." [Judging by experience elsewhere, antityphoid inoculation does not protect against paratyphoid.—E. W. G.]

The bacteriological findings of this epidemic have been published in a paper by E. T. F. Richards and M. M. Canavan,² which is referred to by Southard in the present report. They found that the causal organism was an acid-forming paratyphoid bacillus, *B. paratyphosus A*.

REFERENCES.—¹*Boston Med. and Surg. Jour.* 1914, ii, 545; ²*Ibid.*

PARONYCHIA.

W. I. de C. Wheeler, F.R.C.S.I.

Seff and Berkowitz¹ comment on the failure of text-books to give detailed treatment for paronychia. They recommend that the finger be placed flat on the table, and that the cuticle should be pushed back with the eye end of a probe until the proximal portion of the nail appears. Soaking the finger in hot boric lotion assists this step. The probe is hooked under the nail at the proximal portion. The nail can be easily and painlessly lifted from its bed, and is cut longitudinally for about $\frac{1}{2}$ in. The cut portion is caught in artery forceps

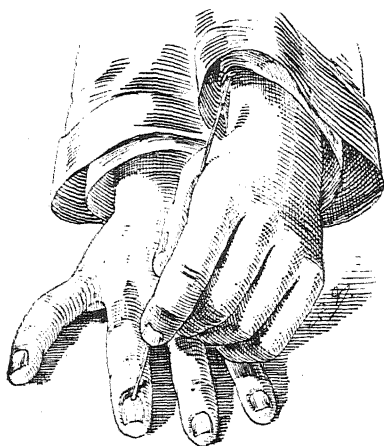


Fig. 44.
Acute paronychia; pushing back the cuticle.



Fig. 45.
Acute paronychia; lifting the nail from its bed.

and divided transversely, care being taken to remove the corners. Attempts to remove more than this are extremely painful. The distal portion of the nail remains untouched, and is ultimately forced off by the new-growing nail. A hot boric dressing is applied frequently. Acute and chronic paronychia are treated in this way.

Eighty-five per cent of the cases were of the acute type. The thumb or index finger was involved in about 60 per cent. About 10 per cent were accompanied by extensive superficial subcutaneous infections. The *Staphylococcus pyogenes* was the predominating infective organism. Eighty-five per cent had no pain during the entire operative procedure, and 15 per cent had only a little discomfort. No anæsthesia, local or general, was required in any case.

Dressings were entirely removed in from ten to fourteen days. The technique is simple. It shortens the period of illness, and is therefore of great value from an economic standpoint. It restores the parts to normal, and is therefore important from a cosmetic standpoint.

REFERENCE.—¹*Jour. Amer. Med. Assoc.* 1915, ii, 234.

PELLAGRA.

Sir Leonard Rogers, M.D., F.R.C.P.

J. F. Siler, P. E. Garrison, and W. J. MacNeal¹ record further studies of the Thompson-McFadden Pellagra Commission, in continuation of the First Progress Report, which was dealt with in last year's MEDICAL ANNUAL. They have made a more intensive investigation of the occurrence and distribution of the disease regarding 847 cases in Spartanburg County. Pellagra is most prevalent among the white population of cotton-mill villages. The high incidence of the disease in women, children, and old persons of both sexes points to the home as the place of infection. In only 19 out of 114 cases did they fail to find antecedent pellagrins living in the same house or next door, and in 7 of the 19 there was association with infected relatives. No relationship to diet could be detected. Active foci of the disease were confined to parts of the city in which unscreened surface or pail privies were in use, while in only five per cent was a water-carriage system of disposal of excreta in operation. Pellagra was found on a large island where there were no streams in which *Simulium* could breed, so that that insect can be excluded as an essential carrier of the infection. Efforts to infect monkeys in various ways failed. No evidence was found of an hereditary factor. The blood shows a lymphocytosis in most cases.

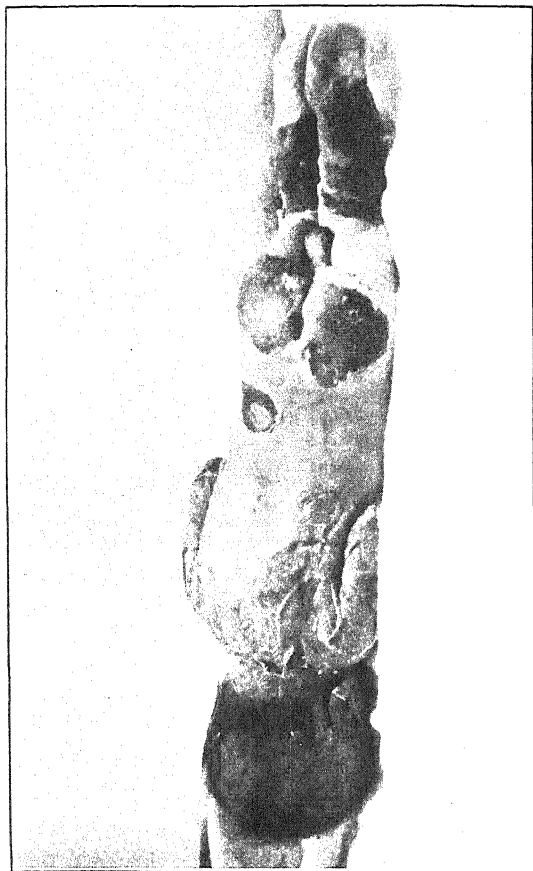
C. H. Lavinder, E. Francis, R. M. Grimm, and W. F. Lorenz² have carried out an elaborate series of experiments to test if monkeys could be infected by means of tissues obtained from fatal cases of pellagra—the buccal, thoracic, and intestinal contents, and material from skin lesions. Of 103 animals used, there was only one doubtful success.

J. B. Macdonald³ emphasizes the importance of the mouth and gastro-intestinal lesions in pellagra. In the prodromal stage the earliest and most frequent symptoms refer to the mouth and throat, while later they are almost as characteristic as the rash. Beginning with unusual sensations in the mouth and dry throat, the oral mucous membrane shows a reddened glazed appearance, with aphthous spots and inflamed gums, sometimes going on to pyorrhœa. Later a greyish appearance and superficial ulcers may be seen, with great tenderness. Gastro-intestinal trouble, with diarrhœa, and the usual skin eruptions, accompany the mouth signs.

TREATMENT.—C. Voegtlin⁴ discusses the treatment of pellagra from the point of view of the pharmacologist and biochemist. A liberal diet with plenty of **Fresh Meat** will cause the symptoms to disappear in mild cases. **Arsenic** is of value in some cases. Exposure to bright sunlight should be avoided. Vegetables may possibly

PLATE XXXI.

PEMPHIGUS NEONATORUM (RITTER'S DISEASE)



contain an injurious amount of aluminium. Possibly the absence of some vitamine may be a factor in the causation of the disease.

W. L. Secor⁵ has obtained some apparent success with **Autosero-therapy** in the treatment of seven cases of pellagra. A piece of cantharides plaster smeared with olive oil is placed on the chest at bedtime. A corner of the plaster is raised, and 1 c.c. of serum removed from the blister with a syringe and injected into the arm. This is repeated weekly.

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1914, ii, 1090; ²*Ibid.* 1092; ³*Boston Med. and Surg. Jour.* 1914, ii, 485; ⁴*Jour. Amer. Med. Assoc.* 1914, ii, 1094; ⁵*Ibid.* 1915, i, 1566.

PEMPHIGUS NEONATORUM. *E. Graham Little, M.D., F.R.C.P.*

Cole and Ruh¹ report an epidemic of this disease occurring in a maternity hospital, nine infants being affected, one of whom died. In all the cases examined, *Staphylococcus aureus* was grown in pure culture from material taken from an unbroken bleb. In the single case in which a post-mortem was possible, the same organism was identified in the veins of the liver and lung.

The symptoms are very characteristic. The skin at birth usually shows no abnormality, but between the fourth and ninth day there suddenly appears, after perhaps a slight preliminary redness, an acute outburst of vesicles, which generally come first around the mouth, and spread to other parts with great rapidity. Extensive exfoliation may result from fusion and breaking of neighbouring vesicles. The palms and soles are seldom affected, a fact which offers a clinical differentiation from syphilitic bullous eruptions, in which these parts are often specially selected. Unless there is a secondary septic infection the temperature is not usually raised. The proportion here recorded of one death in nine cases is unusually high. The disease is most often mistaken for, and has to be distinguished from, the bullous syphilide, often a matter of difficulty which may require the intervention of the Wassermann test.

The relation of this disease to impetigo contagiosa is disputed. Too much reliance may perhaps be placed on the dictum that impetigo contagiosa is always of streptococcic origin, while pemphigus neonatorum is of staphylococcic causation. The question of differentiation of pemphigus from the malady known as Ritter's disease, or dermatitis exfoliativa neonatorum, is also controversial. This is a rare affection, usually appearing later in the life of the infant, up to the fifth week, commencing at the mouth, spreading with even greater rapidity, and causing excessive exfoliation, so that the whole body may be involved within a week or ten days, and the mortality is much higher, averaging 50 per cent. As, however, the staphylococcus is the organism usually found in this type, and the histological findings are similar, it is a reasonable conclusion that Ritter's disease is merely a specially severe form of pemphigus neonatorum. (*See Plate XXXI.*)

Prophylaxis is essential when any case of this disease is noted in an assemblage of infants, and segregation is obligatory. The administration of an autogenous, or failing this, of a stock **Vaccine** is the most effective treatment. Locally, astringents or drying powders are more useful than ointments. **Tinct Iodi**, diluted with two-thirds water, is also recommended for individual small lesions.

REFERENCE.—¹*Jour. Amer. Med. Assoc.* 1914, ii, 1159.

PENIS, DISEASES OF.

W. I. de C. Wheeler, F.R.C.S.I.

Waters and Colston¹ report three cases of *fibrosclerosis* of the penis. The onset is insidious, usually occurring between the ages of forty and sixty, and the indurated areas are not noticed until brought suddenly to the attention of the patient by the deflected erections. These areas are firm, cartilaginous in consistency, and not tender; they are situated on the dorsum of the penis, and are attached to one or both corpora cavernosa. Their margins are indistinctly felt, and the induration gradually blends off into the normal surrounding tissue. Erections may be quite painful, and, sooner or later in the course of the disease, intercourse is entirely prevented, both for this reason and on account of the bending of the penis on erection due to the poor blood-supply of the indurated part. On this account melancholia and neurasthenia are often associated with the disease.

Carcinoma of the Penis.—Certain special characteristics in the etiology are noted by S. H. Cunningham.² There is evidence that the disease may be carried by sexual intercourse. The Jew is comparatively immune from the disease, suggesting that early circumcision may have some influence against the development of the condition. The retention of smegma and urine in cases of phimosis is said by some writers to be a predisposing factor. Kaufmann believes that 29 out of 33 cases which he recorded began as venereal warts. Other cases have been reported as developing upon the scar of syphilitic ulcer or chancre.

The primary growth usually involves the distal portion of the penis, and metastases take place along the lymphatic channels of the penis to the superficial inguinal nodes, then to the deep inguinal nodes, and then under Poupart's ligament to the iliac nodes within the pelvis. If the urethra has been involved by the growth, metastases may take place through the lymphatic channel, passing over the symphysis directly to the pelvic nodes. As has been noted also, the lymphatic channels of the lower half of the abdomen drain into the superficial inguinal nodes. It is necessary, therefore, to remove these channels in great part, in order to prevent a lymph block when all the lymphatic nodes of the inguinal region are removed. The operative procedure is therefore twofold: (1) To remove the growth and the lymphatic channels through which metastases take place; and (2) To destroy the secondary lymph-channels which also drain into these nodes. The extent of the operative procedure necessary is shown in the illustrations (*Plates XXXII, XXXIII.*)

PLATE XXXII.

CARCINOMA OF THE PENIS

(CUNNINGHAM)

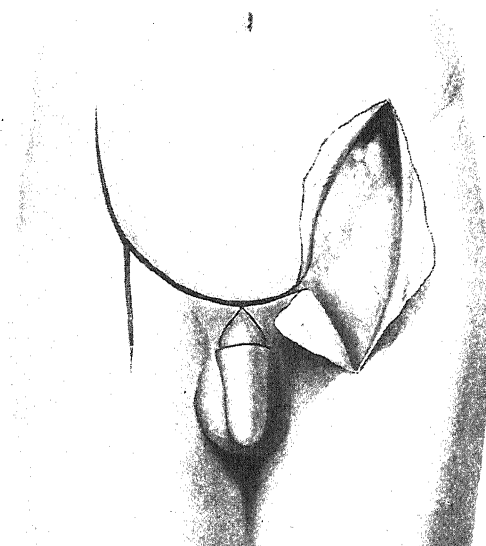


Fig. A.

Kindly lent by 'Surgery, Gynecology, and Obstetric

PLATE XXXIII.

CARCINOMA OF THE PENIS—*continued*

(CUNNINGHAM)

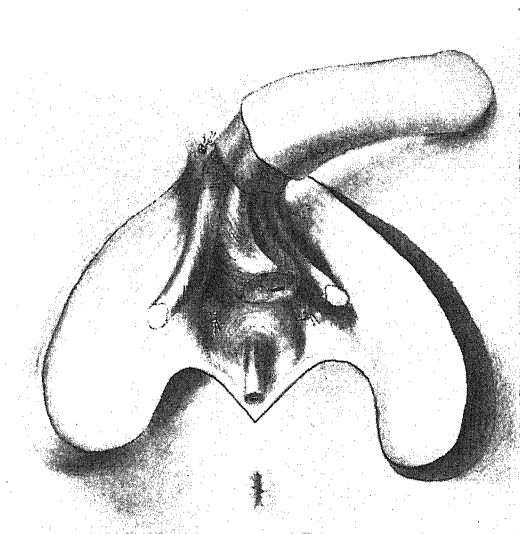


Fig. B.

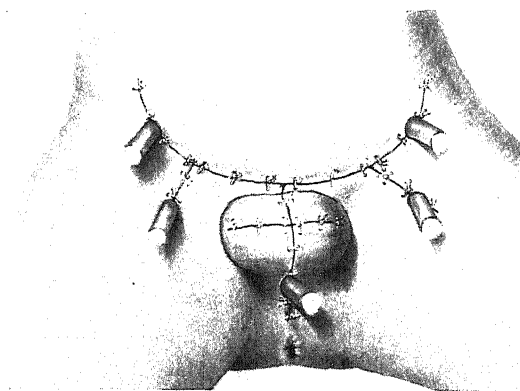


Fig. C.

Kindly lent by 'Surgery, Gynecology, and Obstetrics'

G. B. Massy³ reports two cases of cancer of the penis treated successfully by **Zinc Ionization**. After infiltration of the parts with 2 per cent solution of quinine and urea hydrochloride, six fine zinc needles were inserted immediately beneath the growth, pointing concentrically and connected with the positive pole of the direct current. A small negative electrode pressed against the centre of the growth. A current of 50 ma. was gradually turned on and maintained for fifty-two minutes. On separation of the devitalized tissues, the wound healed promptly without narrowing of the meatus. The patient was seen seven months later with a soft healthy scar and no sign of disease. The second case was equally successful. In this a current of 300 to 700 ma. was employed for twenty-five minutes, and a gland in the groin was readily destroyed by a monopolar application of 70 ma. with three needles for half an hour.

REFERENCES.—¹*Surg. Gyn. and Obst.* 1915, i, 41; ²*Ibid.* ii, 693; ³*Amer. Jour. Surg.* 1915, ii, 299.

PERICARDITIS.

Carey Coombs, M.D., M.R.C.P.

Delbet¹ believes there is a future for the operation of **Cardiolysis** in the treatment of pericardial adhesions, but he contends that, contrary to the usual view, it is the adhesion between epicardium and chest wall, rather than that which obliterates the pericardial sac, that calls for, and is relieved by, this method. Moreover, the operation should, according to him, be directed to rendering the chest wall more pliable, by resection of ribs and cartilages, rather than to opening of the pericardial sac and destruction of intrapericardial adhesions.

REFERENCE.—¹*Presse Méd.* 1915, 113.

PERINEUM, RUPTURE OF.—(*Vol.* 1915, p. 454.)

PERITONEAL ADHESIONS.—(*Vol.* 1915, p. 454.)

PERITONEAL EXUDATES.

O. C. Gruner, M.D.

An excellent study of the cellular characters of peritoneal exudates is set forth by Carslaw.¹ He recommends the use of carbol thionin-blue for staining films made during an operation, for the purpose of ascertaining the presence of bacteria, and estimating the degree of phagocytosis. These data are of value to the surgeon.

The cells considered are (1) endothelial cells, (2) large mononuclears, (3) polynuclears, (4) lymphocytes, (5) mast cells, (6) red corpuscles. The first-named are vastly preponderant. Normally there are very few of the second group, and they are not degenerate. Neutrophils are not met with in normal exudate. Lymphocytes are occasional. The endothelial cells, derived from the omentum, the parietal and visceral peritoneum, the walls of the omental lymphatics, and blood-vessels show active phagocytic powers. Neutrophile leucocytes, lymphocytes, red cells, and even large mononuclears may be engulfed. Such cells may appear vacuolated, which

indicates discharge of some bactericidal ferment from the cell during a period of functional activity.

The following table shows the main characters of the various types of cell:—

CELLS IN PERITONEAL EXUDATES.

	Endothelial	Large Hyaline	Polynuclear	Lymphocyte	Tissue Cell
Size	Large, over 15 μ ; variable	10–11–1 μ ..	Over 8 μ ..	6–8 μ ..	Large
Shape	Ovoid; variable	Always round	Varies ..	Round or oval	Varies.
Contour	Indefinite ..	Rather indefinite	Definite ..	Definite ..	Rather indefinite
Cell-body— Reaction	Faintly basophile	Distinctly basophile	Oxyphile ..	Strongly basophile	Basophile
Protoplasm	Spongy; abundant; Vacuolation occurs	Less abundant	Abundant ..	Very scanty ..	Abundant.
Granules	No ..	Oxydase gran.	Neutrophile and oxydase	No oxydase ..	No
Nucleus— Size	Relatively small	Relatively large	Varies ..	Large.. ..	Varies
Shape	Round or oval	Reniform or ovoid	Polymorphous	Oval or slightly reniform	Varies
Contour	Clearly defined	Moderately defined ..	Clearly defined	Definite ..	Moderately definite
Position	Central usually	Excentric ..	Diffuse ..	Central ..	Central
Intensity of staining power	Moderate ..	Marked ..	Marked ..	Marked ..	Varies
Mitosis	Common ..	No	No	No	Occ.
Nucleolus	One or two ..	One or two ..	Occ.	No	Present
Indo-phenol-synthesis test	No	Yes	Yes	No	No (except parotid and lachrymal gland cells)

The indophenyl-blue test is applied to smears of the exudate which have been fixed in osmic acid (1 per cent) for five seconds. The solutions successively applied to the film are: 1 per cent dimethyl-paraphenylenediamine and 1 per cent α -naphthol containing 1 per cent sodium carbonate. The solutions must be freshly prepared. Bismarck-brown affords a good counterstain.

Carslaw also recommends the routine use of Saathoff's modification of Pappenheim's pyronin methyl-green, because it gives a very marked differentiation between large mononuclear leucocytes and endothelial cells. The appearance of blue granules in cells is not affected by degenerative processes, nor by the chance of the given cell having been engulfed within an endothelial cell. The illustration on the opposite page (*Fig. 46*) shows the appearance in a film of peritoneal fluid in which two large mononuclear leucocytes occur.

The following table shows the proportions of the various cell types met with in different cases:—

	Poly-nuclears	Lymphocytes	Large Hyaline Cells	Endothelial Cells	Free Bacteria
Appendicitis	98 +	0	2 ×	0	Numerous
Serous exudate	2	2	—	96	No
Slightly turbid exudate	46	6	16	32 +	No
Turbid exudate	81	1	10	8 +	Present
Leaking abscess	83 ×	1	9	7 +	Less marked
Perforative peritonitis ..	87 +	1	10	2 ×	Numerous
Suppurative peritonitis..	85 +	3	10	2 ×	Numerous
60 hours after operation	80 +	1.5	18	.5 ×	Diminished
Duodenal perforation ..	36	20	26	18 ×	No

+ = Degeneration forms. × = Showing phagocytosis.

These figures, and others given by Carslaw in his series, show that the amount and virulence of the bacterial invasion can be estimated, as also the extent to which the defensive forces are at work. The

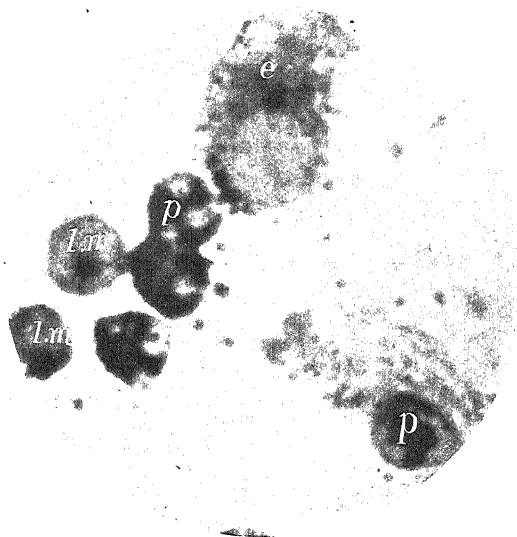


Fig. 46.—(*l.m.*) Two large mononuclear leucocytes. The oxydase reaction is confined to the protoplasm opposite the hilum of the reniform nucleus. (*p*) Polynuclear leucocytes with marked oxydase reaction: (*e*) Endothelial cell with no oxydase reaction, but containing some fat globules. (By permission of "British Journal of Surgery.")

greater the proportion of phagocytting cells, the better the resistance. A finding of a relatively large proportion of polynuclears, with complete absence of endothelial cells, and an abundance of degeneration, is favourable as showing activity on the part of the leucocytes. An unfavourable prognosis is given if there are numerous extracellular bacteria, few large mononuclears and endothelial cells, with early

degeneration of the neutrophiles. In cases of free spreading peritonitis, the number of extracellular bacteria indicates approximately the amount of bacterial invasion. The virulence of this is shown by the vigour of the culture. The relative number of extracellular and intracellular bacteria, and the number of organisms in each phagocyte, give an indication of the relative powers of the reactive and infective forces. Phagocytosis to cells, when present, is a favourable sign, but is not so important as phagocytosis to bacteria. The duration of the bacterial invasion must always be kept in mind when considering the significance of the amount of phagocytosis to bacteria, the relative number of the various cells, and the amount of degeneration. (*See Plates XXXIV, XXXV.*)

This method of study in the immediate vicinity of the operating-theatre has only one difficulty—the time which must be expended in carrying out the counts there and then.

Dudgeon and Maybury² give the results of a further study of the bacterial flora in the peritoneum in cases of perforative gastric ulcer. Five were sterile, 2 showed bacillary infection, 4 were staphylococcal, 1 was an infection with a diphtheroid organism, 6 were pure streptococcus, and 5 were mixed streptococcus and staphylococcus.

REFERENCES.—¹*Brit. Jour. Surg.* 1915, July, 8; ²*Lancet*, 1915, ii, 379.

PHARYNGITIS, SEPTIC.

E. W. Goodall, M.D.

An outbreak of this affection which occurred during January and February, 1915, amongst the domestic staff of the Royal Infirmary, Edinburgh, reported by Alexander Goodall,¹ presents several points of interest. In all there were 35 cases. The prominent symptoms were—sore-throat, headache, moderate pyrexia, a thickly-furred tongue, and inflammation of the fauces. The tonsils were greatly swollen; the uvula also was swollen, and often deviated to one side. In all the cases there was a membranous exudation. This began as yellow patches over the tonsillar crypts; the patches increased in size and coalesced, so as to form a thick white membrane covering nearly the whole tonsil. The membrane did not spread to the pharynx, but in 2 cases it seemed to begin there. It was fairly easily removable. In 8 out of the 35 cases there was a rash. It was a scarlatiniform erythema, limited in some cases to the flexor surfaces of the elbows, but in others it was seen also on the chest and the front of the thighs and legs. In no cases did it appear on the face. In one case the rash seems to have been of the nature of erythema marginatum. There was considerable desquamation afterwards. The febrile period lasted only for one to three days, and by the end of the week most of the patients were well. In 3 cases there was arthritis.

Bacteriological examinations of the faucial exudate yielded a considerable number of organisms—staphylococci, streptococci, pneumococci, and various bacilli, including diphtheria bacilli in 5 cases and the influenza bacillus in 1. The author discusses at some length the diagnosis of this affection; he concludes that it was not

PLATE XXXIV. **PERITONEAL EXUDATES**

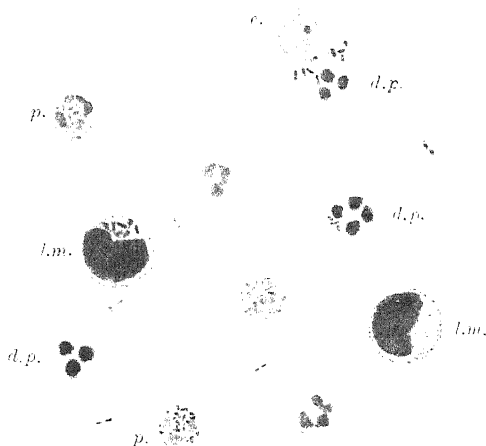


Fig. A.—APPENDICITIS: SPREADING PERITONITIS. Sixty hours after operation. Film of peritoneal fluid, showing: (i) Relative proportion of different cells; (ii) Bacteria, mostly ingested; (iii) Degeneration of polymorphonuclear leucocytes (*d.p.*); (iv) Ingestion of *B. coli* by polymorphonuclear leucocytes (*p.*); (v) Ingestion of *B. coli* by large mononuclear leucocytes (*l.m.*); (vi) Ingestion of *B. coli* by endothelial cell (*e.*); (vii) Ingestion of polymorphonuclear leucocyte by endothelial cell (*e.*). *Stain.*—Pyronin methyl-green (Saathoff).

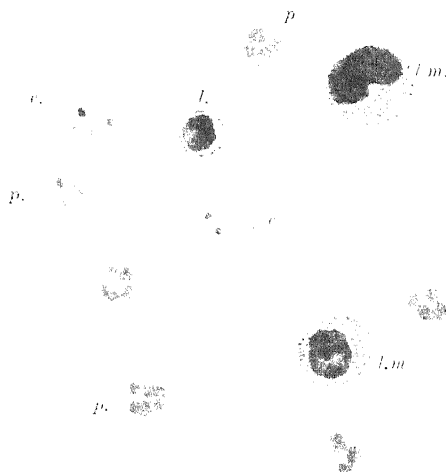


Fig. B.—APPENDICITIS: LOCALIZED ABSCESS. Duration of symptoms, fifty hours. Film of peritoneal fluid, showing: (i) Relative proportion of different cells; (ii) Absence of bacteria; (iii) Healthy polymorphonuclear leucocytes (*p.*); (iv) Two large mononuclear leucocytes (*l.m.*), one lymphocyte (*l.*); (v) Two endothelial cells (*e.*) with vacuolation of protoplasm, one showing nuclear division and an ingested polymorphonuclear leucocyte. *Stain.*—Pyronin methyl-green (Saathoff).

By kind permission of the 'British Journal of Surgery.'

PLATE XXXV.

PERITONEAL EXUDATES—continued

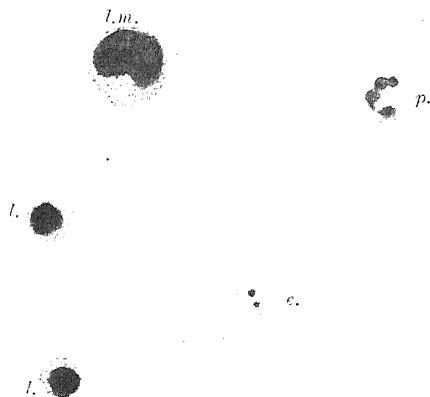


Fig. A.—APPENDICITIS: LOCALIZED ABSCESS. Twenty days after operation. Film of peritoneal fluid, showing: (i) Relative proportion of different cells; (ii) Healthy polymorphonuclear leucocyte (*p.*); (iii) Large mononuclear leucocyte (*l.m.*); (iv) Lymphocytes (*l.*); (v) Endothelial cell with vacuolation of protoplasm (*c.*); (vi) Absence of bacteria. *Stain.*—Pyronin methyl-green (Saathoff).

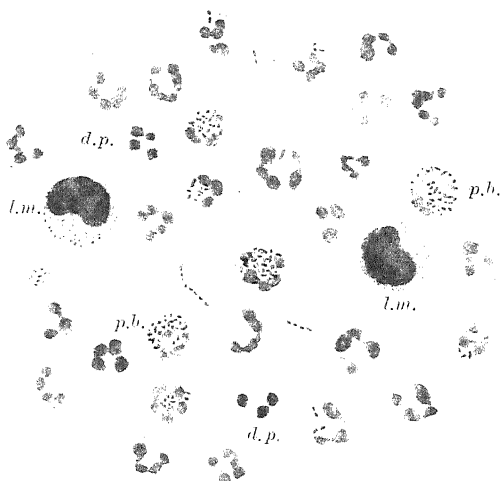


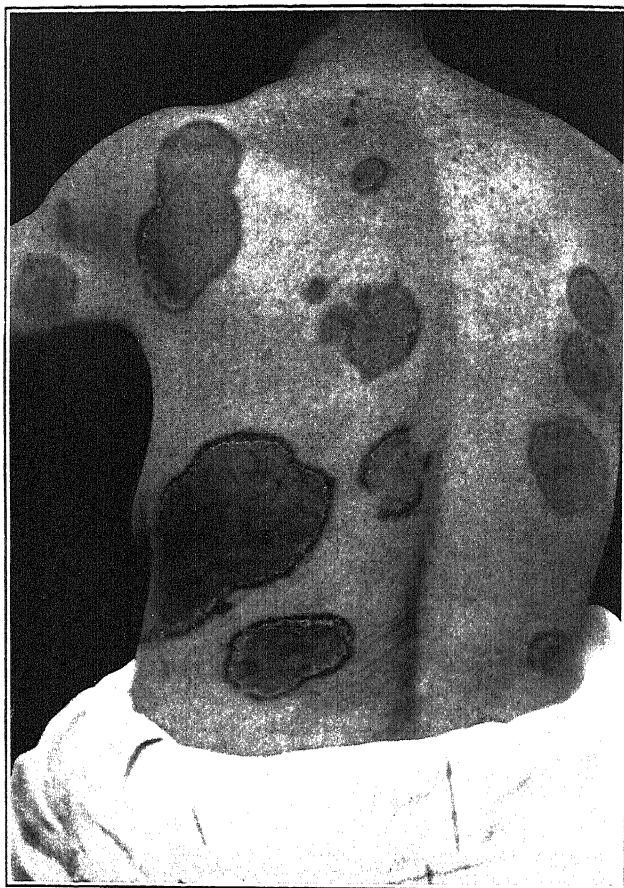
Fig. B.—APPENDICITIS: GENERAL PERITONITIS. Duration of symptoms, eighteen hours. Film of peritoneal fluid, showing: (i) Relative proportion of different cells; (ii) Degeneration of polymorphonuclear leucocyte (*d.p.*); (iii) Polymorphonuclear leucocytes full of bacteria (*p.b.*); (iv) Two large mononuclear leucocytes (*l.m.*); (v) Free bacteria. *Stain.*—Pyronin methyl-green (Saathoff).

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PLATE XXXVI.

PITYRIASIS ROSEA GIGANTIQUE

(DÄRIER)



Dr. Graham

influenza, nor scarlet fever, nor diphtheria (in spite of the presence of the specific bacilli in five cases). It would seem to have been an infectious sore throat, but it is doubtful what organism was the cause: perhaps a new Gram-negative diplococcus which was isolated from a very large proportion of his and other cases.

The treatment consisted of painting the fauces with a 1 per cent solution of **Formalin** three times a day, and administering internally a mixture containing **Sodium Bicarbonate**.

REFERENCE.—¹*Edin. Med. Jour.* 1915, i, 276.

PHARYNX, DISEASES OF. (*Vol.* 1915, *p.* 456.)

PHLEBOTOMUS FEVER. (*See* SANDFLY FEVER.)

PITUITARY GLAND. (*Vol.* 1915, *p.* 456.)

PITYRIASIS ROSEA. *E. Graham Little, M.D., F.R.C.P.*

Recurrent eruptions of pityriasis rosea are extremely rare, and the following well-authenticated instance is reported by Graham Little.¹ The patient was seen by him on July 9, 1915, when he was suffering from an absolutely typical eruption of the disease, for which he was treated only with internal medicine. The eruption disappeared in five weeks, and an interval of complete freedom of about a month was followed by a second acute eruption, which was seen again by Graham Little on Oct. 8, when it was said by the mother to have lasted for about a fortnight. The second attack was also treated with only internal measures, and the eruption in turn disappeared in rather less than five weeks from its inception.

Darier has described a very rare type of pityriasis rosea, in which the patches, which are ordinarily about the size of $\frac{3}{4}$ by $\frac{1}{2}$ in., may cover an area of several inches. Darier has called this type pityriasis rosea gigantea, and in fact its only differentiation lies in the remarkable size of the patches. (*Plate XXXVI.*) Pringle² reports a case which was probably of this character. In the course of discussion, Graham Little reported a similar case seen by him. In both these patients the eruption disappeared spontaneously after six or seven weeks' duration.

REFERENCES.—¹*Lancet*, 1914, ii, 1196; ²*Brit. Jour. Derm.* 1915, 307.

PLAGUE. *Sir Leonard Rogers, M.D., F.R.C.P.*

The Ninth Report of Plague Investigations in India, contains one paper on work done in India, and several on investigations at the Lister Institute, London. The former deals with epidemiological observations in the Madras Presidency, which have been carried on for over a year by J. C. Kunhardt and J. Taylor with the aid of five Indian assistants. It was undertaken in order to try to ascertain why many parts of this presidency have almost or entirely escaped plague. The affected parts have been the most elevated and coolest areas in contact with other presidencies which suffered from plague,

while the lower hot dry plains and the east coast have largely escaped the disease. In no part were the number of rats and rat-fleas too few to allow of plague infection, while the rats in the areas which escaped were especially susceptible to the disease. The hot dry area is unfavourable to the transport of infected fleas through it. They conclude that the physical features and climate of the Madras Presidency have an important influence in limiting the distribution of plague in it. They are not inclined to credit the passport system, early introduced by Colonel King when Sanitary Commissioner, with much influence in checking the spread of the disease.

Sydney Roland contributes several short articles on his experiments on vaccination against plague, which work was interrupted by the war. He found that the nearer the culture media used for growing the plague bacillus approach those that obtain in the body of the living animal, the greater is the protecting power of the vaccine. He has studied Strong's method of immunization by living avirulent cultures, and found that the addition of serum proteids to the culture medium increased the protective power of the cultures. Different races of plague bacilli vary in the efficiency of the antigen. He has obtained an extremely virulent body-strain of plague bacilli against which he was unable to produce immunity even with an antigen prepared as far as possible under body conditions, so that should such a strain be met with in a local epidemic, failure will result from any protective inoculation at present known. With a body-strain of plague bacilli, it is possible to prepare a serum which protects against a body-strain of organism. He tried ultra-violet light for sterilizing plague bacilli, but found it destroyed the antigen, rendering it useless as a vaccine.

A. W. Bacot has continued his investigations on the infection of rat fleas by plague bacilli, and found that they could carry the organisms up to forty-seven days, while it may well be longer. The obstructing mass of bacilli in the valve of the proventriculus may break down and allow of the organism extending from the posterior end of the stomach to the anterior chamber of the pharyngeal pump, thus allowing of regurgitation of the infecting organisms into the wound. The same writer also deals with the development of plague bacilli in bugs (*Cimex lectularius*), which was first established by the Russian worker Verjbitzki in 1904. The growth of the bacilli appears to be rapid at first, but afterwards to slow down, though he produced infection of mice on the forty-eighth day after feeding on an infected animal. He thinks the infection is due to regurgitation from the stomach of the insect. The work in this report therefore confirms, and in some points extends, that recorded in former ones dealt with in earlier editions of the MEDICAL ANNUAL.

G. M. Guiteras² records an outbreak of plague in Havana, which was successfully dealt with by the sanitary authorities. The infection is believed to have come direct from the Canary Islands, where the Spanish authorities had concealed it. Plague-infected rats were found before human cases occurred, and anti-rat measures at once

put into force. A second focus appeared in some stable buildings where disinfection would have been futile, so the building was destroyed by fire and the focus eliminated. Thanks to an efficient sanitary organization with full legal powers, and an authoritative medical board with absolute powers regarding the diagnosis of cases by bacteriological means, thorough measures were also taken to deal with the first dangerous focus in the centre of the commercial district of the city. Seventeen blocks of houses were completely depopulated within twenty-four hours, and all the houses disinfected and made rat-proof, and not reoccupied for three weeks. This measure was quite effective in stamping out the disease. Sulphur and cyanide of potassium fumigation was found very satisfactory for killing all insect and animal life in the houses.

TREATMENT.—In the Havana outbreak 80 c.c. doses of Yersin's Serum were administered intravenously twice daily during the first three or four days of the disease as long as the temperature remained above 39° C. (102·2° F.), over 500 c.c. having been administered in one patient. One to 2 grams of calcium chloride were given daily to counteract any ill-effects of these large doses of serum. The results were excellent, the mortality having been only 22·2 per cent, but the outbreak was a mild one, all the cases having been bubonic except one fatal one, which showed plague bacilli in the blood.

REFERENCES.—¹*Jour. Hyg. Suppl.* 1915, Jan.; ²*Jour. Amer. Med. Assoc.* 1915, i, 29.

PLEURAL FLUID.

O. C. Gruner, M.D.

Morelli's reaction in pleural fluids is discussed by Zannini.¹ A test-tube is filled with saturated aqueous corrosive sublimate. Three or four drops of fluid are added. If a yellowish dense clot appears, which adheres to the side of the tube, or falls to the bottom *in toto*, the fluid is an exudate. If the clot breaks up into flakes, the fluid is a transudate. The latter form of reaction is always obtained with tuberculous fluids.

REFERENCE.—¹*Rivista Ospedaliera*, 1914, 561.

PNEUMONIA.

Lewis A. Conner, M.D.

Willson,¹ in investigating *the heart* in fatal cases of pneumonia, found microscopic evidence of damage to its musculature in every one. The changes found included cloudy swelling, fragmentation, and disappearance of the striations in the muscle fibres; areas of round-cell infiltration; proliferation and swelling of the nuclei, and, sometimes, extensive hæmorrhagic infiltration. In no case, except in old persons and in those afflicted with organic cardiac disease, was fatty degeneration of the heart-muscle observed. Willson believes that the importance of vasomotor collapse as a cause of death in pneumonia has been unduly emphasized, and thinks that the collapse is often due to changes in the heart itself.

In a routine study of *the spinal fluid* in pneumonia, Rohdenburg and Vander Veer² found that, in a series of 16 fatal cases, 14, or 87

per cent, showed pneumococci on culture, and only 2 (13 per cent) yielded negative cultures. On the other hand, among 43 cases which recovered, but 15 (34 per cent) gave positive cultures, and in 28 (66 per cent) the cultures were negative. Among the cases giving positive cultures, the average cell-count in the fatal cases was 214, and 50 in those which recovered. All the fluids yielding positive cultures gave reactions for both sugar and globulin. The fluids negative to culture showed only a slight increase in cells (30), and were otherwise normal. In only one instance could the spinal fluid be termed purulent, and this was the only case which presented meningeal symptoms. All of the patients, however, who showed a positive spinal culture were profoundly depressed, reacted badly to infection, and for the most part were very delirious. The writers conclude that, in cases without meningeal symptoms, pneumococci are present in the spinal fluid much more frequently than is usually supposed. They suggest that the early lysis of pneumococci, with the liberation of endotoxin in close proximity to vital centres, may well explain the profound and sudden cardiovascular collapses, as well as the marked mental symptoms so often noted.

TREATMENT.—A summary is given by Cole³ of the work of the Hospital of the Rockefeller Institute in the study of pneumococcus infections, with a view to the development of some effective method of specific treatment. A study of the different types of pneumococci found in acute lobar pneumonia shows that they may be divided into four groups. Three of these, Types I, II, and IV, present no constant morphological or cultural peculiarities, but do show distinguishing immunological differences. In Types I and II the organisms possess immunological characteristics peculiar to the respective group. Thus all the organisms of Type I are agglutinated by a serum produced by the immunization of an animal to any one of them, and such an immune serum protects mice against any organism of that group. The same is true for the organisms belonging to Type II. In Type IV are grouped those strains of pneumonia which had no common immunological characters. Type III is reserved for organisms of the *Pneumococcus* (*Streptococcus*) *mucosus* group. These last organisms are not agglutinable, nor does an immune serum protect mice against them. The clinical manifestations of infection due to these four types show considerable differences, at least as regards severity. Among 103 cases not receiving specific treatment, the mortality in those due to organisms of Type I was 25 per cent; of Type II, 32 per cent; of Type III, 47 per cent, and of Type IV, 6 per cent. From the standpoint of prognosis alone, therefore, the determination of the type of infection in the individual case is of importance.

Great efforts were made to determine the nature of the intoxication in pneumonia and to produce an antitoxic serum. These efforts, however, thus far have not been successful. Such a serum has been found to have very slight antitoxic power as tested in guinea-pigs, and to have only slight protective effect when injected together with

living organisms. On the other hand, it has been known for some time that by the injection of repeated, increasing doses of living organisms it is possible to produce immune sera having high protective power against pneumococci, but hitherto the clinical results of the use of such sera in the treatment of pneumonia have not been satisfactory. One of the chief reasons for this seems to be that such an immune serum is effective only against the type of organism used in the process of immunization. Thus, for an infection caused by an organism of Type I, only a serum produced by the injection of organisms of Type I will be of any value. In order to have such a serum effective in any type of pneumonia it would be necessary, first, to produce a serum of high protective power against the type of organism concerned; second, to have a satisfactory method of standardization of the serum; and, finally, to have a method for the rapid determination of the type of organism in each individual case. These conditions, Cole says, have now been satisfactorily met as far as organisms of Types I and II are concerned, and it has been found possible to produce a **Serum** of great protective power against organisms of each of these two types. In the clinical studies thus far carried out, the serum treatment of cases due to organisms of Type I has given much more promising results than that of cases of Type II. Judgement as to the merits of the serum has been based not only upon mortality statistics but also upon the facts, first, that where the blood cultures have been found to be positive before beginning treatment, cultures made after the first dose of serum have been negative, and next, in the treated cases the appearance of immune substances in the blood has been shown to occur much earlier than it does when no such specific treatment has been employed. To be effective, the serum must be used in large amount and fairly early in the disease. The administration of such large amounts has been followed in many cases by serum sickness, but it is believed that in future this may be avoided by the use of concentrated serum.

Raw⁴ reports three cases of pneumococcus septicaemia which recovered under treatment with autogenous **Vaccines**. A new 'curative' treatment of pneumonia is presented by Park,⁵ who cites twelve cases of acute lobar pneumonia in adults cured by the intravenous administration of a solution prepared as follows: 15 gr. each of **Sodium Salicylate** and the soluble **Phosphate of Iron** are dissolved in 2 oz. of distilled water. The solution is sterilized by heat, and on cooling there are added 15 min. of a 'saturated **Calcium-creosote** mixture.' The whole is passed through a porcelain filter. From 2 to 5 c.c. of this were given at a dose, and usually only two or three injections were required. The writer claims to have had no failures with this method, and to have seen prompt and marked improvement and rapid convalescence. Cornwall⁶ described in detail a plan of treatment used with success by him. The essential features include a liquid diet composed of milk, barley-water, and orange-juice; the administration of small amounts of sodium and calcium

chloride; and the avoidance of all drastic purgatives, of antipyretics, of expectorants, and of so-called specific drugs. If the heart required stimulation, small doses of strychnine, strophanthus, or caffeine were used. In a series of 133 consecutive hospital cases of lobar pneumonia, one-fourth of which were in children, the mortality was 10.5 per cent.

Injection of **Blood Platelets** is said to increase the patient's power of resistance (*p. 6*).

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1914, lxiii, 981; ²*Ibid.* 1915, lxiv, 1227; ³*Brit. Jour. Child. Dis.* 1915, 80; ⁴*Lancet*, 1915, i, 705; ⁵*Med. Rec.* 1915, lxxxvii, 397; ⁶*Ibid.* lxxxviii, 345.

POISON GAS.

Herbert French, M.D., F.R.C.P.

There seems to be little doubt that the 'poison gas' which the Germans have been using has, in many cases at any rate, been chlorine vapour, though the French have an idea that it has often been bromine.¹ The chief effects of the gas, after inhalation, are to induce an intense feeling of tightness in the chest and a sense of being totally unable to make an inspiration. The cases may be of mild degree, severe, or extreme; Hendry and Horsburgh,² from personal experience of cases, subdivide them clinically as follows:—

“ GROUP I.—THE MILD CASES.

“*Class A.*—In these, the cough has been frequent, painful, and harsh; the physical signs in the chest were rough breathing with sonorous rhonchi, indicating an essentially 'dry' condition of the chest, suggesting a reddened and roughened bronchial apparatus.

“*Class B.*—The cough was frequent and painful in these cases, but the harshness was not so apparent; the sounds in the chest were moist, and there was some secretion of a greenish, viscid character which was expectorated by the patient.

“In both these classes of Group I the patients complained of headache, pain in the eyes, and abdominal pain, but they were not cyanotic, and the symptoms tended to disappear rapidly, with the exception of some increased frequency of respiration, which persisted for days, and had not entirely subsided upon their discharge to convalescent camp.

“ GROUP II.—THE MODERATELY SEVERE CASES.

“These patients were actually ill. They were cyanotic, with frequent panting and painful respiration, which caused them the greatest discomfort. Headache was very marked, and pyrexia up to about 100° F. was common for three or four days. The physical signs varied in different parts of the chest. In the upper part the sounds were loud, with sibilant rhonchi. Lower down, especially at the back, there were submucous râles, indicating a 'bronchiolitis.' Such patients were usually drowsy, and tended to get much worse at night.

“GROUP III.—THE VERY SEVERE CASES.

“The following was a typical instance. The man was admitted in a semi-comatose condition twenty-four hours after being exposed to the fumes. He was intensely cyanotic, respiration-rate 30 to the minute, pulse 88, throat dry and red, tongue cracked and furred.

“When roused—which could only be done with great difficulty—the patient indicated by signs that he had severe pain in the chest. He was unable to cough, and there was much rattling with the breathing. Physical signs showed râles all over the chest, front and back. The fremitus of these râles was easily palpated by the hand. The condition was acute pulmonary cedema following exposure to irritant fumes. Bleeding was resorted to, and twelve ounces of blood were withdrawn from the median basilic vein at the elbow. The intensely dark colour of the blood and its remarkable rapidity of clotting were the special features noted, and the latter condition made the operation very tedious and difficult. The patient seemed to be relieved for a time, but never regained consciousness, and died in twenty-four hours from the time of his admission, and forty-eight hours from the time of being exposed to the fumes. Oxygen was administered throughout without any benefit. Postural treatment resulted in large quantities of frothy secretion pouring out of the nose and mouth, but at no time was the patient able to expectorate this for himself.”

Post-mortem Examination.—There were no external signs of interest. Rigor mortis was complete two hours after death. The lungs were fully expanded, crepitant throughout, and floated in water. On section they emitted a very tenacious, frothy and slightly blood-stained exudation from all parts of both lungs. The same was also found filling the trachea, bronchi, and bronchioles, indicating a condition of general acute pulmonary cedema. Subpleural hæmorrhages were also found in various places. The heart was normal. The liver was congested. The spleen was not enlarged or congested. The other abdominal organs were normal, likewise the brain. The urine was normal in colour, acid, specific gravity 1020, and contained no pathological products. Smears taken from the blood, and stained by Leishman's stain, showed a remarkable number of cells indistinguishable from myelocytes, and also an increase in the lymphocytic elements of the blood. The polymorphonuclear leucocytes were diminished to about 30 per cent. The red cells were unaltered.

Well known though chlorine gas is, cases of poisoning by it were rare until the present war made them common. Hitherto most instances have occurred accidentally in laboratory workers, and few of these have been fatal. There has consequently been little literature upon the clinical signs, and the prevention and treatment of the condition. It seems generally agreed³ that the essential point in prophylaxis is to inhale the contaminated air through something that has been saturated with a solution of sodium bicarbonate and

hyposulphite of soda—also known as sodium thiosulphate; the saturated cloth or respirator being kept damped when in use; whilst the eyes are protected at the same time, either by modified goggles, which may form part of the respirator, or better still by a special helmet which combines both respirator and goggles. The action of chlorine on sodium thiosulphate is somewhat complex, the products being sodium sulphate, sodium chloride, sodium tetrathionate, free sulphur, and free sulphuric and hydrochloric acids. The function of the bicarbonate of soda is to neutralize the last two. In practice, the special helmets that have been devised have rendered it possible to remain in air impregnated with chlorine vapour, and to inhale it with impunity.

Practically, no curative treatment has yet been devised for cases of acute chlorine 'gassing.' The milder conditions get well slowly by themselves. The severe lesions prove fatal as the result of acute pulmonary œdema associated with bronchiolitis and bronchopneumonia. There are hopes, however, that **Atropine** injections may prove actually curative; and that they may do so may be deduced from experiments with chlorine upon animals, subsequently treated with and without atropine, carried out by Cow⁴ in the pharmacological laboratory at Cambridge. He showed, moreover, that, whereas **Oxygen** inhalations alone were of little benefit, oxygen inhalations after atropine were more useful than was atropine without oxygen. He considers that this is due to the fact that atropine tends to keep all bronchioles in a state of maximum dilatation.

REFERENCES.—¹*Brit. Med. Jour.* 1915, i, 774; ²*Ibid.* 964; ³*Ibid.* 856; ⁴*Lancet*, 1915, i, 1147.

POLIOMYELITIS.

J. Ramsay Hunt, M.D.

R. W. Lovett¹ analyzes 149 cases occurring in the Vermont epidemic of 1914. In all patients the muscles were tested as to function, and were classed as wholly paralyzed, partly paralyzed, and normal. The condition of each muscle was then marked on charts. It became evident that partial paralysis was much more common than total. Of 1452 muscles affected, 416 were totally paralyzed and 1036 partly; that is, the relation of partial to total paralysis was as $2\frac{1}{2}$ to 1. This predominance is of importance. The reason would seem to lie in the grouping and relation of the nerve cells in the anterior cornua of the cord. These cells lie in longitudinal bundles, which are naturally largest in the cervical and lumbar enlargements. This matter of partial paralysis is most important in the matter of treatment, as we shall see when we come to discuss the therapeutic measure of muscle training, because in such muscles there remains some initiative, and with it the power of developing more muscular volume and new associations, by repeated passages of impulses from brain to muscle.

A tabulation was next made as to the affection of individual muscles. This table gives the number of total paralysees of each

muscle, the number of partial and total paralyses, and the proportion of total to partial in each. The main facts are that the quadriceps, gluteals, and gastrocnemius lead in frequency, and that paralysis of leg muscles is much more frequent than of arm muscles. Abdominal paralysis existed in more than half of all the cases (79), and affection of the muscles of the spine in more than a quarter (40). The latter points have a distinct bearing on the occurrence of scoliosis, and indicate that such affections are more common than had been supposed. The investigation of paralyses of the arm showed that (1) The paralysis was most frequent at the shoulder, and diminished in frequency from the shoulder to the hand; (2) The paralysis was severest (that is, that the percentage of total cases was largest) in the shoulder, and diminished as one went toward the hand; and (3) Paralysis of the muscles of the left arm was very much more frequent than of the right arm.

The therapeutic measures at our disposal in fairly early cases are massage, electricity, and muscle training. **Massage** may be expected to improve the local and general circulation, to facilitate the flow of lymph, and to retard muscular deterioration. It cannot, however, be expected to facilitate the transmission of a motor impulse from the brain to the muscle. **Electricity** is less highly regarded in the treatment than was formerly the case. The unintelligent use of electricity month after month to the exclusion of other measures has been one of the handicaps which has stood in the way of the best progress in many cases. **Muscle Training**, on the other hand, rests on a sound physiological basis, works out empirically better than any other of the measures, and the large proportion of partial paralysis in the cases observed shows its reasonableness.

We come now to the final, and what Lovett believes to be the most important, part of his paper, namely, the possible effect of over-fatigue and the over-use of massage on returning muscular function, a phase of the treatment question almost wholly neglected. If we take the case of a partly paralyzed muscle with some remaining power, we are anxious to bring about in that muscle the greatest possible return of functional power; that is plainly our object of treatment. Now the rational exercise of a normal muscle results in increase of size and power of that muscle, and presumably the result would be the same in a muscle weakened by infantile paralysis which was rationally and physiologically exercised or massaged. We are, however, dealing with muscles in many instances very weak and incapable of doing much work, and it must be an easy thing to over-exercise them; but it seems reasonable, in the early stage of returning power, that we should be exceedingly careful in the use of muscles in walking and in the use of heavy and prolonged massage—much more careful than we are at present. The proportion of total to partial paralysis is greatest in the muscles which have the greatest weight to oppose in the standing and walking position, and least in those which have the least weight, in a series of cases observed some months after the acute

attack. If over-use is the harmful factor that he believes it to be in retarding recovery, its effect would be noted in just those muscles which show the highest proportion of total paralysis.

The chief point which Lovett makes is that excessive and too early use of muscles which are only partially paralyzed is an important factor in the determination of residual paralysis. This he infers from the large proportion of muscles paralyzed which are engaged in associated movements.

W. MacKenzie² emphasizes the great importance of the muscle tissue in this disease, considered apart from the lesion of the anterior horn cells. He states that as a primary pathological factor the muscle by itself could scarcely be considered; that biologically, however, it is all-important for the purposes of treatment. The first consideration in the treatment of acute infantile paralysis is **Rest**. This must be immediate and anatomical. A muscle is at rest only when placed in a position of zero, and its origin and insertion are as nearly as possible in the same horizontal plane. The zero position is the position of anatomical rest in which the individual muscle itself is relaxed, and both its own function and that of its opponent are prevented. Necessary rest is obtained by position and the use of suitable splints, and should be instituted at once.

Later, re-education of the paralyzed muscles may be attempted; but with care and gentleness. In such exercises the muscle at the beginning of the treatment should always be in the position of zero, gradually working up to the highest point achieved in the previous treatment. The various surgical and orthopædic measures, muscle, tendon, and neural transplantations, are also briefly considered, but are regarded as secondary in importance to proper muscle rest and re-education, and practically unnecessary if these are properly carried out from the beginning.

The use of **Thymus Gland** is also advocated in 15- to 20-gr. doses in the twenty-four hours, with the qualification that "its use is, of course, accessory to the basic treatment, rest—that is, the anatomical rest of muscle, and the recognition that poliomyelitis represents, not a paralysis, but a loss of part of muscular function, and that the muscle must be re-educated along the lines of the acquisition of its muscular function, and, above all, that the rest be immediate." Massage is also advised, but with the warning that it be carried out with the muscle only in the zero position, and in the mildest manner possible. [While the importance of carefully conducted rest, position, massage, and re-education is recognized by all authorities in the care of these cases, it would be rather difficult to accept the fundamental importance of the zero position of muscle tissue as a curative factor in acute poliomyelitis.—J. R. H.]

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1915, i, 2118; ²*Brit. Med. Jour.* 1915, i, 60.

POLYCYTHÆMIA, SPLENOMEGALIC. (See ERYTHRÆMIA.)

POLYNEURITIS.*J. Ramsay Hunt, M.D.*

Multiple neuritis is a very common affection, and may arise from a variety of causes, toxic and infectious. Sensory and motor fibres are both involved in the vast majority of cases. It is rare for polyneuritis to assume a purely motor or sensory type, although both are occasionally observed. When confronted with the motor type, the diagnostic difficulties are increased by the close resemblance to ascending spinal paralysis of the Landry type and the acute poliomyelitis. J. Michell Clarke¹ reports a series of cases of the *motor type of multiple neuritis* in which objective disturbances of sensation were absent, though a certain amount of pain was present in some cases. The following criteria for differential diagnosis are given: In polyneuritis the onset and progress of the palsy is slower than in a typical case of Landry's paralysis, and in the course of the second or third week, if not at the onset, the paralysis begins to be definitely greater at the periphery of the limbs: if not in all four extremities at first, yet either in the arms or in the legs, and to predominate in the extensors, whilst alterations in the normal electrical reactions of the most affected muscles begin to be evident. These changes in electrical reactions precede the wasting, which in some cases is not very marked throughout the illness. The diagnosis from acute anterior poliomyelitis is not so difficult, as in the great majority the sufferers from this disease are much younger than those from acute toxic polyneuritis; and if in exceptional cases the age cannot be taken into account in distinguishing between the two affections, there are the decided signs of constitutional disturbance at the onset of acute poliomyelitis, the characteristic pains on passive movements of the joints, the absence of such symmetrical paralysis, the escape of a muscle or group of muscles in the otherwise paralyzed limb, the recovery of some muscles soon after the onset, and the frequent presence of a large lymphocytosis in the cerebrospinal fluid.

REFERENCE.—¹*Bristol Med.-Chir. Jour.* 1915, 9.

PREGNANCY, DISORDERS OF. *Bryden Glendining, M.S., F.R.C.S.*

Prenatal Care.—Whitridge Williams¹ discusses the limitations and possibilities of prenatal care. The Johns Hopkins obstetrical records show that in 10,000 cases the foetal deaths were 705, and the treatment during pregnancy is discussed under the causes of the foetal deaths. (1) The most common single factor inducing foetal death is syphilis, which in the above records accounted for 26.4 per cent of foetal deaths, that is, of those dying in the first fortnight; but an equal number were discharged alive, to become hereditary syphilitics, and perhaps die of it later. In the case of syphilis, prenatal care is simple, but difficulty lies in the diagnosis. For this purpose the history of previous still-births is important, and should lead to active treatment in future pregnancy. Lessons in sex hygiene he thinks useless, as one is not dealing with a state of Utopia. (2) Unknown causes account for 18 per cent of foetal

deaths, and obviously there is nothing to be done in this class for the present. (3) Dystocia accounts for 17.6 per cent, and should in every case be recognized at the eighth month by careful examination, and then sent for treatment in delivery at the hands of experts in hospital. (4) Prematurity, representing 7.1 per cent of the deaths, should be met by attention to personal hygiene, counteracting overwork and poor nutrition, which is the most potent factor in later months. (5) Toxæmias, 6.5 per cent, if detected early and efficiently treated, would almost disappear as a cause of foetal death. Of all these deaths, he estimates that after due prenatal care, the numbers might have been reduced 40 per cent.

Blood-pressure.—In 450 cases, Newell² has investigated the blood-pressures during pregnancy, and records the following results. The reports of the cases show that a considerable number of patients have a temporary rise in blood-pressure during pregnancy, without the development of untoward symptoms. The significance of this rise can only be elucidated by the study of a larger number of cases. In other instances the rise in blood-pressure was followed by the appearance of albumin, and is to be taken as a definite indication of the development of toxæmia; in only one among these latter did convulsions develop, while the remainder reacted to treatment. On the other hand, 39 cases with slight traces of albumin in the urine showed no changes of blood-pressure. Persistent high blood-pressure (140 or over) in the absence of other signs is not necessarily dangerous, whereas a rise from normal or low to high pressure, and especially if accompanied by the appearance of albumin, is to be regarded more seriously.

Eclampsia.—Haultain³ publishes his further experiences in the use of **Veratrone** in the treatment of eclampsia. He has now employed it in seventeen cases of eclampsia or pre-eclamptic states, with the inhibition of fits in every instance. One case which ended fatally was the subject of chronic Bright's disease and had ten fits. The treatment consists in the immediate injection of 1 c.c. of veratrone, with stimulation of diaphoresis by hot packs and, if possible, attempts at free purgation by calomel and jalap. The blood-pressure is noted at frequent intervals, and upon reaching 160 a further dose of $\frac{1}{2}$ c.c. of veratrone is immediately given. The diet is limited to milk. The action of the drug induces a marked and rapid lowering of the blood-pressure. This depressant action is generally only temporary, lasting but a few hours, and associated with marked slowing of the pulse-rate and increase of the urinary secretion and diaphoresis, and even, in some instances, vomiting, particularly when the pulse-rate falls below 50 per minute. It is possible, however, that the veratrone has a further action in the nature of an antidote to the eclamptic toxin, for in subsequent rises of blood-pressure, fits seldom occur.

Pregnancy.—Mall⁴ has specially examined 117 specimens of ectopic tubes with a view to elucidating the cause. Chronic inflammation,

which results in plicating of the tube lining, and a condition of papillary salpingitis with peritoneal adhesions, are the most obvious pathological factors, whether the inflammation be of gonococcal or of puerperal origin. He is further of opinion that extra-uterine gestation occurs most in tubes which are well advanced towards recovery, and that had conception been delayed, the result might well have been an extra-uterine development. He also examined the specimens with special regard to the state of development of the embryos, and notes that only 16 per cent appeared to contain normal embryos; but even this figure is abnormally high, because some, on histological investigation, proved faulty; 25 per cent contained pathological embryos, and the remaining 59 per cent pathological gestation products but no fœtus.

Pollak⁵ in treating 227 cases of extra-uterine pregnancy, has had 4 deaths, 3 of them due to septic peritonitis and 1 to hæmorrhage on the operating-table. In those cases presenting symptoms of shock, he does not operate forthwith, but adopts the following procedure: (1) The patient is put in the extreme Trendelenburg position; (2) A hypodermic injection of morphia with atropine is administered; (3) The pulse is counted every quarter of an hour; (4) The blood-pressure is taken until it reaches 115; (5) Neither saline nor stimulants are given. With the pulse down to 120 per minute and the blood-pressure up to 115, it is considered safe to operate. Only the large clots and the affected tube are removed, while a quart of saline is left in the peritoneal cavity to mix with the free blood. Drainage is dangerous and a cause of infection.

Young⁶ has examined the cases of severe hæmorrhage in Boston City Hospital. In 62 cases out of a total of 215 extra-uterine gestations, there was a mortality of 19.3 per cent among the more serious cases. Of those dying, the author thinks that 8 patients in whom death was attributed to shock might have been got in a better state before operation, and so saved. He is also constrained to think that a great deal depends on the social class of the patient, as among the poor and neglected the mortality is much higher.

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1915, i, 95; ²*Ibid.* 393; ³*Brit. Med. Jour.* 1914, ii, 537; ⁴*Surg. Gyn. and Obst.* Sept. 1915, ii, 289; ⁵*Amer. Jour. Obst.* 1915, i, 946; ⁶*Boston Med. and Surg. Jour.* 1915, i, 131.

PRENATAL CARE. (See PREGNANCY, DISORDERS OF.)

PROSTATE, DISEASES OF. J. W. Thomson Walker, M.B., F.R.C.S.

Bransford Lewis¹ discusses very fully the obscure forms of *prostatic obstruction and vesical atony*. He states the views of the various writers on the subject, and points to their wide divergence and lack of harmony. Certain of them place the blame on the detrusor system, which is deemed too weak to expel the vesical contents, while others ascribe the fault to the neck or sphincters, which are too strong, and in some mysterious or unrecognized way offer undue resistance and produce retention. He concludes that (1) The exact causation of

urinary retention should be sought for in all cases before adopting a plan of treatment. (2) It should always be found in one of two factors, viz. (a) physical obstruction of some kind, or (b) disturbance of the nervous mechanism controlling urination. (3) There is no such thing as 'unaccountable' atony or urinary retention; such a term represents an incomplete diagnosis. (4) There is no such thing as 'incurable' atony, except when it is caused by some nerve degenerative process (tabes, etc.) that precludes restoration of the expulsive power; and the term is unjustifiable in most of these cases. (5) Even when the retention and atony are caused by nerve degeneration, much can be done in the way of treatment, both locally and internally, to facilitate urination, and improve the condition prevailing. (6) When the cause is a physical obstruction, its complete removal paves the way to restoration of the expulsive power. (7) The most frequent and important of the obscure, unrecognized causes of obstruction are: (a) ill-defined contraction at the vesical neck (demonstrable sometimes only by palpation through the opened bladder or urethra); (b) unrecognized syphilis, acquired or hereditary, affecting the spinal centres. (8) Such conditions are by no means confined to adult life, and should be looked for and recognized at any age, from infancy up, diagnosed and treated in accordance with the referred diagnosis always demanded by cases of urinary obstruction. (9) Syphilis is a surprisingly frequent cause of such conditions. Lack of syphilitic history or general nerve symptoms in obscure cases should not preclude investigation by means of a Wassermann blood test; and if this prove doubtful, a Wassermann test of the spinal fluid should be done as well. (10) The supreme value of early recognition and differentiation of such cases appears in the opportunity it offers of affording appropriate treatment before the case has assumed the hopeless phases that preclude reclamation or benefit.

Page² has found **Spinal Anæsthesia** of great assistance in many genito-urinary operations, such as suprapubic prostatectomy. General anæsthesia must be deep enough to relax the abdominal muscles, and does not prevent shock. If ether be used, it tends rather to increase the amount of hæmorrhage, and the risk of urinary and intestinal complications is greater. It tends also to increase pre-existing pulmonary troubles. Successful spinal anæsthesia, on the other hand, practically prevents shock, and even in cases where the spinal block is not perfect the operative shock is greatly diminished. The risk of suppression of urine is smaller from the fact that the patient can be given fluids and stimulants by the mouth, much sooner than after general anæsthesia. Pre-existing pulmonary troubles are less likely to be increased, and distention of the bowel occurs less frequently. The mental shock of being conscious during operation can be eliminated by administering nitrous oxide gas and oxygen. A previous subcutaneous injection of morphia or omnopon and atropine, with or without scopolamine, should be given. Page used novocain in all his cases. In the first 21 cases a solution weighted with marmitol

was used, but in the last 22 cases an unweighted solution with supra-
renin borate was used. The dose of this solution varies from 2 to
2½ c.c. according to the weight, size, and condition of the patient.
Raising the buttocks and flexing the thighs tend to raise the height
of the anæsthesia. The head is kept stiffly raised at the same time.

The advantage of the unweighted solution over that heavier than
the spinal fluid is that the foot of the bed can be raised after the
operation, in order to treat temporary collapse or hæmorrhage. In
a large majority of the cases spinal anæsthesia was given for special
reasons, such as great age, vascular degeneration, low specific gravity
urine, emphysema, and bronchitis. Only 2 out of 43 cases died, and
in neither of these was the death connected with the anæsthesia.
There was no case of permanent sequelæ following the spinal injection.

Keyes³ uses the following ingenious method for controlling *hæmor-
rhage after prostatectomy*: The patient is put on the operating table
in the dorsal position, but with his legs supported on leg-rests, so
that the hips are flexed at an angle of about 45°. After suprapubic
enucleation of the prostate, a grooved staff is inserted into the
urethra, and a long Reverdin needle threaded with a piece of catgut
about 18 in. long is plunged into the groove of the staff, through the
perineum, until it can be felt by the finger in the suprapubic opening.
The staff is then withdrawn, and two Walker suprapubic bladder
retractors are introduced. These, by making lateral traction on the
bladder, elevate the two edges of the bladder neck like a veil, and
make it plainly palpable to the examining finger. The needle carry-
ing the catgut is inserted through the edge of this veil just deep
enough to get a good hold at the lateral angle. The eye of the needle
is pushed out of the suprapubic wound, the catgut unthreaded, and
the needle withdrawn into the prostatic cavity and again pushed
through the veil on the opposite side. The catgut is now threaded
again, and the needle withdrawn through the perineum. By pulling
on this loop of catgut from the perineum, the neck of the bladder is
drawn down and hæmorrhage is controlled. The ends of the suture
are tied over a short rubber tube. Hagner has used an inflated
rubber bag for the same purpose. This has a string attached to one
end, and at the other end a hollow rubber tube. A long curved sound
is passed along the urethra, and the tip of the rubber tube is pulled
over the sound, which is then withdrawn, carrying the tube with it.
The bag is now lying against the neck of the bladder, with a tube
coming out through the urethra and a string through the suprapubic
opening. The bag is inflated with a large syringe. The finger is
passed around the bag to see that the torn mucous membrane falls
back into the prostatic cavity. The bag is allowed to remain in
place for twenty-four or forty-eight hours, but is deflated at the end of
twelve hours. To make the bag collapse, it is necessary to use suction
with the syringe. To remove it, traction is made on the string.

According to Thomas,⁴ the factors which govern the *mortality of
prostatectomy* may be grouped under three heads: (1) The pre-

operative investigation and preparation of patients; (2) Improvement in technique; (3) The best post-operative treatment. In his opinion the first and third factors are more important than the operation itself. The evil effect of completely evacuating the bladder in cases of marked retention of urine are well recognized. Congestion and hæmorrhage from the bladder and kidneys may follow this procedure, and shock and even sudden death may supervene. To perform prostatectomy or any other major surgical operation, when the patient is in this negative phase, would almost certainly be fatal. The preliminary treatment of such cases by catheterization is the most important factor in the reduction of the mortality of prostatectomy. This has led a few urinary surgeons to recommend a two-stage operation in all cases. Thomas considers this unnecessary, and only demanded in exceptional cases. As a rule intermittent catheterization, or the catheter *en demeure* closed, but opened from time to time or allowed to drain continuously, will suffice for drainage. During the period of pre-operative treatment, particularly if urinary infection is present, total irrigation with silver nitrate is imperative, and attention should be paid to the gastro-intestinal tract. Urinary antiseptics and large draughts of water should be given, and patients may be braced up by the administration of such drugs as strychnine, digitalis, nitroglycerin, caffeine, sodio-benzoate, sparteine, and acetothecoin-sodium. The renal function is important, and should be carefully tested. The tests usually employed are indigo-carmin, phenolsulphonephthalein, cryoscopy of the blood and urine, and the determination of urea. "It matters little whether deductions are drawn from the onset of elimination, or made from quantitative calorimetric determination." Thomas uses what he terms an index of elimination. The index is determined by dividing the quantity of indigo-carmin eliminated during the first hour by the quantity excreted during the third hour after injection. When the amount eliminated during the third hour equals or exceeds that excreted during the first hour, the kidney function contra-indicates serious operative intervention, such as prostatectomy, unless the total amount eliminated in three hours exceeds 20 per cent, when operation may be considered, even though the index of elimination may be very low.

Tenney and Chase⁵ have studied the causes of mortality in 229 fatal cases of prostatectomy. The greatest danger, they state, in the operation of prostatectomy is death from uræmia, or from conditions closely associated with it. After examining a patient it should be possible to say whether he is a good, fair, or poor risk, with reference to this condition. If he is not in the first class, an attempt should be made to put him there before operation. The percentage of deaths from uræmia among the cases operated within two days was 37 per cent, while the percentage of deaths from the same cause among patients who were observed long enough to have functional tests made was 19 per cent. The second great danger is death from hæmorrhage and shock. An operation rapidly performed in order

to avoid shock may produce shock and hæmorrhage from being roughly executed. Embolism is the third danger. It occurs when perineal, urethral, and suprapubic drainage tubes are used, and after both operations. The authors suggest that sometimes the drainage tubes may be the cause of the emboli. Deaths under the heading of cardiac and general debility are uncertain in many cases; some would, with an autopsy, be called uræmic, and some embolic.

An article by Judd⁶ gives information in regard to cases of *cancer of the prostate* treated at the Mayo clinic. There were 878 prostatectomies performed at the clinic, and in 93 of these cancer was found. In addition to these, 84 cases were diagnosed as cancer but were not operated on, as they were too advanced. In the 93 cases operated on, the age varied from fifty-one to eighty-two years. The duration of the symptoms varied. Nine had symptoms only six months, while eight had been troubled more than ten years; two of these more than fourteen years. More than half the patients had had symptoms for from one to four years. In patients having symptoms for a number of years, the early symptom was probably due to hypertrophy. The chief factor in the clinical diagnosis of cancer of the prostate is "an irregular hard 'feel' to the surface of one or more lobes of the gland." The type of pain may be suggestive, but is not diagnostic. In 75 per cent of the cases, cancer was associated with hypertrophy, and in the remaining 25 per cent the cancer occurred in prostates in which no evidence of hypertrophy was found. "Radical operations for this condition have gained favour very slowly, not because it is impossible to remove the growths with a reasonable degree of mortality, but largely because it is impossible to do a thorough radical removal of the cancerous prostate and the adjoining part of the bladder without completely destroying the mechanism of urinary control." Patients who are incurable but fairly comfortable, either with or without the catheter, should not be operated on. When the symptoms are extreme, or the use of the catheter causes great pain, even if the prospects for complete cure are not good, a palliative operation is indicated. In 82 out of 93 patients operated on the results were known. In all of these an ordinary prostatectomy, either suprapubic or perineal, was done. Of these, 8 lived more than three years, 12 lived more than two years, 13 lived more than one year, 24 died within the first six months, 5 died, time unknown. One patient, who had a very small cancerous nodule removed, was living and free from symptoms nine years after the operation.

REFERENCES.—¹*Ann. Surg.* 1915, i, 276; ²*Lancet*, 1915, i, 1015; ³*Jour. Amer. Med. Assoc.* 1914, ii, 2217; ⁴*Ibid.* 1909; ⁵*Boston Med. and Surg. Jour.* 1915, i, 437; ⁶*Surg. Gyn. and Obst.* 1915, i, 274.

PSORIASIS. (See also SKIN DISEASES, GENERAL THERAPEUTICS OF).

E. Graham Little, M.D., F.R.C.P.

The following directions are suggested by Wise¹ for treatment of inveterate patches of psoriasis. The scales are first removed by the application of a dressing consisting of soft soap to which 5 to 10 per

cent **Salicylic Acid** is added. This is bandaged in position and left on for twenty-four hours. If the skin is too much inflamed by this procedure, **Calamine** lotion is applied until inflammation has subsided, and then the following ointment is vigorously rubbed into the patch :—

R	Ol. Rusci	10 parts	Lanolin (Anhydrous)	25 parts
	Acid. Salicyl.	20 parts	Sapon. Mol.	25 parts
	Chrysarobin	20 parts		

M. et ft. ung. Sig. : Rub in vigorously.

Ichthyol in the strength of 10 per cent may be added in cases in which the susceptibility to inflammation seems to be a marked feature. If itching and burning are present, **Menthol**, 3 gr. to the ounce of ointment, may be incorporated.

The method of rubbing is important. A stiff-bristled brush or a swab made by wrapping several thicknesses of flannel round a stick may be used to apply the ointment, each patch receiving from a quarter to half an hour of friction twice daily. If this causes too marked a dermatitis the ointment must be intermitted, and the following lotion applied until the skin has quieted down :—

R	Phenol	℥j	Glycerin	℥j
	Menthol	gr. iv	Lime-water	℥j
	Prepared Calamine	℥ij	Rose-water	q.s. ad ℥iv
	Zinc Oxide	℥iij		

M. et ft. lotio. Sig. : Apply frequently or use as a wet dressing.

Impervious coverings should never be put over chrysarobin-treated skin. (See *Plate XXXVII.*) The action of **Chrysarobin** is explained on page 12.

Holland² found a coincident improvement in two cases of psoriasis which he treated, for other reasons, with **Vaccines**: in the first instance an autogenous vaccine derived from a culture grown from the patient's tonsils during an intercurrent attack of tonsillitis. In the second case the patient suffered from arthritis, and for this he was given a mixed vaccine composed of streptococcus, staphylococcus, and *Micrococcus catarrhalis*. The same combination was used in a third case of psoriasis without other complications, in which, however, light-baths were employed also. [It is to be noted that no specific vaccine was used, and it might very well be an explanation in the first two cases that the improvement in the complicating and accompanying disorders was attended by an improvement in the psoriasis.—E. G. L.]

REFERENCES.—¹*Ther. Gaz.* 1914, ii, 618 ; ²*Jour. Amer. Med. Assoc.* 1915, i, 903.

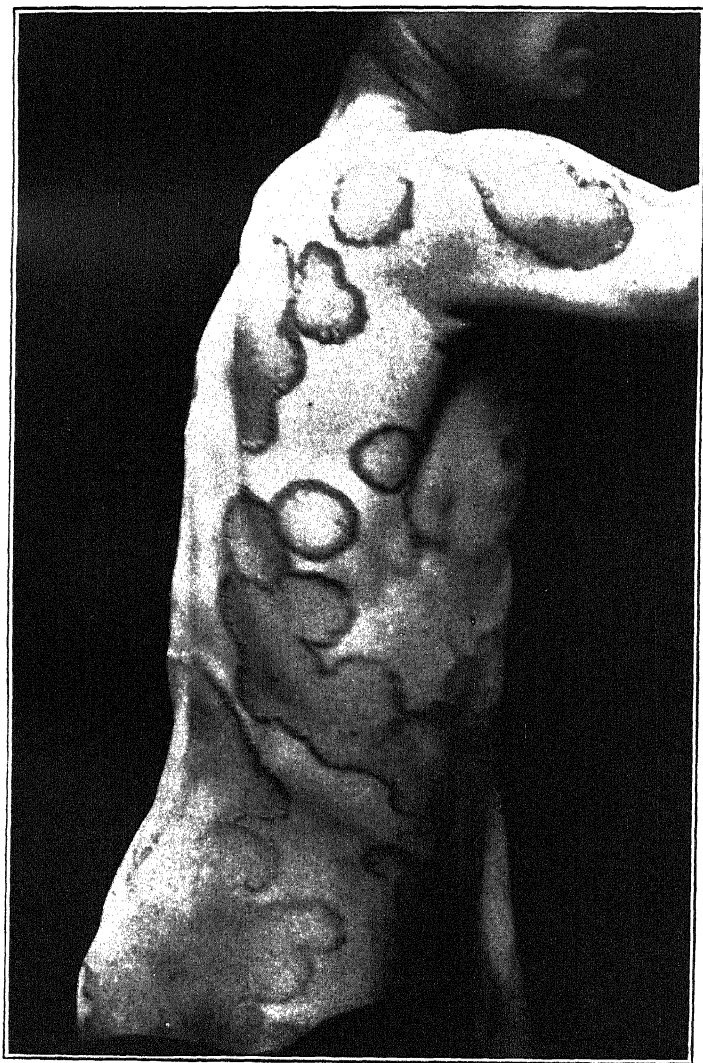
PSYCHO-ANALYSIS. (See also MENTAL DISEASES.)

Bedford Pierce, M.D., F.R.C.P.

In the Morrison Lectures, Stoddart¹ gave a clear and interesting account of the principles of psycho-analysis. The psychological theories underlying this method of investigation are first explained, then the technique, and lastly its applications and results. Although these lectures are not critical, and may be said to accept too easily

PLATE XXXVII.

GYRATE PSORIASIS



Dr. Graham Little

the teachings of Freud and his followers, especially in certain directions, they form one of the best condensed accounts of the subject that have been published in English. The subject of psycho-analysis does not admit of brief explanation, and it is impossible to abstract the lectures; only a very few of the subjects he touches upon can be mentioned.

In referring to the classes of patients likely to receive benefit by psycho-analysis, Stoddart considers it of little use in the treatment of confusional, thyroigenous, and organic insanities, nor in congenital defect, nor in epilepsy dependent upon toxæmia. In the form of epilepsy dependent upon psychical disturbance there is a prospect of relief by means of psycho-therapeutics. In manic-depressive insanity the value of analysis is limited. Maniacal patients cannot attend sufficiently, and psycho-analysis during an attack of melancholia may be harmful. Between the attacks there is some expectation of benefit, but a complete analysis is not recommended. Dementia præcox presents great difficulties, and should not be attempted by a beginner. Paranoia and dementia paranoides are usually unsuited for analysis; negative transferences may be set up which may result in actual bodily injury to the physician, whilst the prospect of benefit is very slight. The neuroses and the psycho-neuroses form the chief field for the work of the psycho-analyst, viz., neurasthenia, hysteria, and compulsion neurosis, under the last of which are included persons troubled with imperative ideas, obsessions, morbid fears, and impulses; and for these Stoddart states no other successful line of treatment is known.

It is essential that the patient should be able and willing to co-operate in the psychical investigation; they should have some pretence to education, and be not over fifty years of age. Stoddart says in reference to the labour involved: "I ought to say at once that psycho-analysis is not easy, even for those who have far greater experience of the method than I have, and it takes a very great deal of time. It is customary to spend with each patient an hour a day five or six times a week. It then takes a fortnight to obtain a complete history and a clear insight into the nature of the case, and at least three months to complete a cure. Most cases take longer than this, and even Freud himself, purposely selecting very difficult cases, has spent as much as three years over a single patient before he effected a recovery. It is satisfactory to note that a partial analysis is often beneficial, and we are constantly endeavouring to discover 'short cuts,' but even then we are bound to acknowledge the difficulty that psycho-analysis is very expensive. It is not more so, however, than many surgical operations, and the gratitude expressed by patients is sufficient testimony that all this time and expense are well worth while. . . . Before beginning a course of psycho-analysis, it is necessary to make sure that it can be continued. You must be sure that neither your own engagements nor those of your patient are likely to interrupt it. To leave the patient with a half-revealed

complex for more than a day or two will only make him worse. . . . In private, the financial aspect must also be considered, and you must be satisfied that the patient can afford to continue the treatment for at least four months, not only because a doctor cannot afford to spend an hour a day without remuneration, but because free cases are for some reasons unsatisfactory to treat."

The technique recommended by Stoddart is briefly as follows :—

1. Systematically examine the patient, and remedy as far as possible all defects of physical health, errors of refraction, carious teeth, nasal obstruction, source of septic infection, etc.

2. Having made a provisional diagnosis and decided that psycho-analysis is suitable,

3. Begin with a word-association experiment. (Stoddart gives a list of 100 suitable words.) In some cases, at the same time, mental disturbances can be investigated by a galvanometer, sphygmograph, or stethograph, but they are mere accessories. The galvanometer is placed in a circuit passing through the patient, and indicates variations in current dependent upon excitement or emotional disturbance. The others record alteration in the pulse and the rate of breathing. The stimulus words are called out successively, and the patient is required to react to each by stating the first word that comes into his mind on hearing the stimulus word. This is noted, together with the length of time taken. The words are read a second time and the associations again noted. The physician then searches the results for indications of embarrassment or other sign that a 'complex' has been touched. The signs are : undue length of the reaction time, strange associations, apparent contradictions, failure to react in the same way a second time ; accompanying emotional disturbance, increased frequency of pulse, or possibly alteration in electrical resistance. These are indications of intrapsychic resistance, which has to be overcome, and the patient is then asked to explain and follow up the trains of thought that the reaction word introduced.

4. The method of free association involves a willingness of the patient to report frankly and without any reservation his thoughts as they arise in the mind, no matter how incoherent or how painful and repugnant they may be. "He is to allow his thoughts and speech to run wild." In this way his associations will here and there tap the unconscious and throw light on the hidden springs of his trouble. Stoddart expressly warns the beginner from telling the patient his conclusions as to the nature of the complexes before he has discovered them himself, and adds, "I can here foresee an objection that there is no need for the psychologist if he be not allowed to supply interpretations of the patient's data or even to engage in conversation, and I have indeed had the experience of a patient who, admitting her recovery, remarked, 'But I do not see what you have done.' I accepted this as a great compliment."

5. The interpretation of dreams. In this, Stoddart is a follower of Freud, recognizing the 'manifest' and 'latent' content of dreams

and their distortion by means of 'displacement,' 'condensation,' 'symbolization,' and 'dramatization.'

In the third lecture, dealing with the results of psycho-analytic methods as applied to the neuroses and psycho-neuroses, Stoddart also is a close follower of Freud, and with him places sexual stresses of various kinds in the foremost place amongst the causes of these nervous maladies. In this he makes many very positive statements which will not escape criticism.

Speaking of neurasthenia, which condition he limits to patients exhibiting an undue tendency to fatigue, he states: "In all cases of this kind, without exception, there is always to be found one essential etiological factor, viz., sexual excess. In the majority of cases this takes the form of masturbation."

In reference to 'anxiety neurosis,' characterized by a persistent state of fear, and an exaggeration of the normal physical signs of fear, such as rapid or irregular pulse, palpitation, anginal attacks, vertigo, insomnia, night terrors, and hyperæsthesia for noises, he states that "the anxiety neurosis owes its origin to an accumulation of mental excitement which finds no somatic outlet, and further, that this excitement is almost always, probably always, of a sexual nature. . . . While sexual abstinence in its many forms is the chief cause of the anxiety neurosis, there are other factors: heredity, overwork, severe illness, and prolonged watching by the bedside of sick relatives."

Speaking of the psycho-neuroses, which he puts on a different plane from the neuroses, Stoddart states that like dreams they are "compromise formations between repressed wishes and the forces which represent them," and they present the same mechanism of distortion, so that the patient may be said to live his dream.

Anxiety hysteria, including hysterical phobias and day dreams, are stated "to occur in patients who have renounced masturbation and refuse to relieve an over-stimulated sexual impulse." Conversion hysteria, in which some somatic symptom or some motor or sensory nervous symptom appears, is stated to have a sexual basis, and to arise from a persistent strife between some painful memory and the restraint of the 'censor,' resulting in a compromise which by distortion becomes the hysterical symptom.

Compulsion neurosis, which term is used to include obsessions and morbid irresistible impulses of all kinds, is also looked upon as a disease of the unconscious, and to depend upon repressed sexual ideas usually traceable to early childhood. Stoddart concludes that "an obsession represents a compensation or substitute for an unbearable sexual idea of very early infancy," and he claims that psycho-analysis is the only really successful method of treatment.

Stoddart follows Freud with little hesitation even into some of his extreme views which have aroused so much opposition. In alluding to the opposition which these views will necessarily meet, he says: "In spite of all we can say, the subject of sex will remain

taboo; yet no physician of experience can deny the enormous rôle played by sexual conflicts in the genesis of the neuroses. I do think cases sometimes occur in which the psychogenetic conflict is non-sexual, but they are so rare that I can see the psycho-analytic literature of the future augmented by reports of such cases as curiosities."

This view of the importance of sexual repression and conflict in the production of neuroses is combated by Meyer Solomon,² who criticizes at length the Freudian theory. He takes exception to (1) Their failure properly to limit and define their terms; (2) The adoption of a purely sexual view-point of the universe as well as of man, instead of giving impartial consideration of all our instincts; (3) The rôle of infantile and early childhood tendencies has been over-emphasized; (4) Symbolism always based on sexuality has likewise been carried to the extreme; (5) A loose method of reasoning and of proof by analogy and of making broad generalizations and dogmatic and unproved assertions has been adopted. "Freudism as it stands to-day must undergo wholesale modification. . . . It must be clearly understood that . . . psycho-analysis must be differentiated from sexology and sexual analysis. . . . Let man be looked upon as the human being he is. And when psycho-analysis is approached from this standpoint, and not from a purely sexual basis, then we shall have a firmer, truer, better, more human psychology, and a psycho-analysis which will be characterized by breadth of scope, by fair-mindedness, guided by a real, scientific, unbiased search for truth."

In an article on the 'Psychopathology of Everyday Life,' Miller³ gives many instances in which psycho-analytical investigation provides an explanation of many peculiar incidents in daily life. The forgetting or the disliking of certain names is traced to past unpleasant associations with persons of the same name; mistakes in spelling, substitutions of words, errors in writing, are shown to depend upon incidents of past life. "Such mistakes are not to be ascribed to chance, haste, inattention, or the like. These are only predisposing factors, not the cause." A large number of instances are given and the explanations provided. Referring to a case in which a girl gave an irrelevant answer which disclosed the information she wished to conceal, Miller remarks: "If anyone thinks I am here reading a meaning into what has no meaning at all, I can only say that such an attitude is neither justifiable nor scientific, that the mistakes of everyday life must, *a priori*, have some explanation, and that until someone can furnish psychological laws which can be adopted over as wide an area and hold as true as those so ably set forth by Freud, then, and only then, can his theory and its practical application be questioned." He concludes by quoting Kohnstamm: "The biological way of thinking sees in the facts of consciousness only mountain peaks, which soar into sight over a sea of mist, whilst the mountain as a whole—the totality of vital phenomena—remains hidden from the immediate consciousness. If one confines oneself to the view from above, there appears to be no natural connection,

no regularity. If, however, one disregards the mist that conceals the base, one recognizes how the mountains rise from the plain and have a common basis. One attains scientific insight of the unity of what, under chance conditions, is partly visible, partly invisible."

Kempf⁴ relates a case of functional paralysis of the left leg, in a man, age 27, who had walked with crutches for fourteen months. Repeated suggestions that he was able to walk produced no benefit. When the history of the case was investigated, it was found he had long been worried about masturbation and 'filthy' ideas in relation to his mother. An immoral episode in early childhood was also elicited. Without any special treatment the patient made a good recovery, which began directly these mental difficulties and conflicts were seriously faced.

Ring⁵ describes a girl, age 21, with distress in the head and sense of fatigue. She suffered from fears and terrors, and was considered dangerous to herself. These were traced to an unhappy family life, improper advances of a relative, a cruel brother. "A full recital of the details of the case cured the patient, and now for nearly six months she has been happy and self-supporting for the first time in her life."

It is, however, practically impossible to digest reports of cases, and the attempt to do so is unfair to the physician, whose conclusions rest on many hours' investigation of the mazes of a disordered mind. On the other hand, the reviewer in reading the reports meets on every page assumptions that provoke criticism, and not rarely sweeping generalizations for which little evidence is produced. It is too soon to express a decided opinion on this difficult subject. The new psychological methods provide in many cases a reasoned explanation of how certain symptoms arise, but it is doubtful if they assist in elucidating the deeper question why persons differ so greatly in their reaction to the stresses and trials of life.

The interpretation of dreams is discussed by St. John Bullen,⁶ and on the whole Freud's views are sympathetically treated. He sums up as follows: "The advantage of Freud's theories concerning dream states is that they are constructed on the same plan as those dealing with the waking life. His system, instead of merely furnishing a series of observations on apparently disconnected, inapposite, and shifting dream phantasies, is one, definite, and claiming a reaction linked to cause in a definite manner. Freud's subtlety of explanation of the enigmatic variations of dreams is remarkable, but it is impossible not to feel that his scheme is often artificial, and its tendency to force a solution of mental problems which is the result of mixture rather than combination. . . . One cannot help speculating, too, as to how far the supposed solutions arrived at by psycho-analysis, both in the case of dreams and of waking, are the result of suggestions by the examiner." In referring to the pronounced sexual tendency of Freud's explanations, Bullen says allowance must be made for "the extraordinary protrusion of sex matters into the life

of the Teuton." He refers to the large number of child suicides, and considers these are dependent upon precocious sexual development, and that in consequence Freud is working in an atmosphere alien to us. He concludes: "Probably an almost exclusive attributing to sexual motives in the constitution of the neuroses is a passing cult of fashion, whose advocates, like vultures, scent carrion from afar. The more sceptical minds in this country may, on the contrary, prefer to assume the passive rôle of the ostrich. The truth may well be sought in the mean course. The attitude towards Freud least just, and to ourselves most unprofitable, is that of unqualified disparagement or indifference: his is one of the greatest and most ingenious psychological minds of our time; it is only necessary to allow for a certain exuberance of imagination, fertility of expansion, and arbitrariness in inference."

REFERENCES.—¹*Rev. Neurol. and Psychiatry*, 1915, May, June, July; ²*Psycho-analytic Rev.* 1915, Jan.; ³*Ibid.* April; ⁴*Ibid.*; ⁵*Ibid.*; ⁶*Jour. Ment. Sci.* 1915, 17.

PUERPERAL INSANITY. (See MENTAL DISEASES.)

PULSE, IRREGULAR. (See also AURICULAR FIBRILLATION).

Carey Coombs, M.D., M.R.C.P.

Josué¹ propounds a new method of analyzing pulse irregularities, which involves no special apparatus beyond an ordinary wooden stethoscope. He claims that it is possible to auscultate the movements of the jugular vein just above the sternoclavicular joint with such accuracy that the observer may diagnose some at any rate of the principal types of arrhythmia. The patient must lie absolutely flat on his back. The small end of a wooden stethoscope, not more than 2 cm. in diameter, is applied at an angle of 45° with the long axis of the neck, to the jugular vein just above the right sternoclavicular joint. With practice, the observer learns just how light a pressure he should apply in doing this. Three sounds are heard in a normal subject, corresponding almost exactly with the three waves seen in each cardiac cycle in a jugular tracing. The first of these is the sound of auricular systole, the second that of ventricular systole, the third coincides with the beginning of ventricular diastole. These statements have been confirmed by graphic phonendoscopic records taken by de Meyer and Gallemaents, of Brussels, in researches interrupted by the war.

By the use of this auscultatory method Josué claims that it is possible to differentiate between the bradycardia of heart-block and slowing of the whole heart by vago-sinus influences. In the latter, all three sounds are heard in each cardiac cycle, though the groups of three are abnormally separated, while in the former, single sounds, corresponding of course to auricular systoles, intervene in the long pauses occurring between the triple groups of sounds. Total block, with its rapid auricular and quite separate slow ventricular rhythm, is only interpreted by prolonged and careful auscultation, in which

the ventricular beats are identified by comparison with the radial pulse. The total arrhythmia associated with auricular fibrillation is identified by absence of any kind of rhythm, and also of the auriculo-systolic sound. Extrasystoles also can be recognized, and in many cases it is possible to assign them their origin, whether auricle or ventricle. Josué cautions against too heavy a pressure on the neck, since this brings into prominence sounds arising from compression of the carotid artery.

Paroxysmal Tachycardia.—In Miles's² case, which affords an excellent illustration of the close relations existing between auricular flutter and auricular fibrillation (indeed, the case was probably one of the former variety of tachycardia), crystalline **Strophanthin** was given in 1-mgram doses by intramuscular injection during attacks. It almost invariably terminated the attack within an hour or a little over, the heart sometimes passing through an auricular fibrillation phase on its way to recovery.

Pulsus Alternans.—White's³ systematic investigations go to show that this form of arrhythmia is by no means rare. In 300 cardiac patients examined by him with graphic records, there were 71 examples of the alternating pulse. In a large majority of these the alternation was only perceptible just after a premature ventricular contraction, that is, the normal pulse was interrupted by a ventricular extrasystole, and immediately after this the pulse was found to be alternating. The commonest associations were arteriosclerosis, hypertension, and cardiac enlargement. In about two-thirds of his cases **Digitalis** and rest in bed effected clinical improvement, even though the alternation persisted. About one-third of his patients died within ten months of the condition being first detected. On the other hand, as Carver⁴ points out, alternating pulse may occur in persons with no apparent cardiac lesion, and may disappear, leaving them fit to carry on normal activities without limitation.

Herrick⁵ and McGill⁶ point out that the sphygmomanometer may be used for the detection of the alternating pulse. The feeble beats are cut out by a compression that still allows the stronger beats to come through, so that if the right degree of compression be applied to the brachial artery through the armlet, the radial pulse-rate will be decreased by one-half.

Heart-block.—Hart's⁷ very interesting observations suggest that in certain cases of block, even when due to organic disease, the auriculo-ventricular connections are still controlled to some extent by vagus influences, and can therefore be modified by atropine. He thinks that the counteraction of digitalis by atropine, in so far as the depressant action of the former on conductivity is concerned, suggests that this action is exerted through the vagus, and not directly on the muscle strands which connect auricle with ventricle.

Barton⁸ finds that the depression of conductivity which digitalis may produce can be removed or reduced by administration of **Caffeine**. This drug also counteracts the propensity of digitalis for provoking

extrasystoles. Hart⁹ thinks that atropine can quicken the idioventricular rhythm (i.e., the independent rhythm which the ventricle assumes in complete block). Lea, on the other hand, points out that in most of the cases with a rapid idioventricular rhythm, of which he records one,⁹ this rapidity was probably due to digitalis. In this respect, therefore, it would seem that atropine and digitalis are not antagonistic. Byrom Bramwell¹⁰ notes, without attempting any explanation, the occurrence of rapid, feeble pulse for a minute or two immediately after the termination of the syncopal attacks occurring in two cases of heart-block.

REFERENCES.—¹*Presse Méd.* 1915, 262; ²*Amer. Jour. Med. Sci.* 1915, i, 484; ³*Ibid.* ii, 82; ⁴*Lancet*, 1915, ii, 815; ⁵*Jour. Amer. Med. Assoc.* 1915, i, 739; ⁶*Ibid.* 2061; ⁷*Amer. Jour. Med. Sci.* 1915, i, 62; ⁸*Ibid.* ii, 352; *Lancet*, 1915, i, 1289; ¹⁰*Edin. Med. Jour.* 1915, i, 168.

PURPURA.

Blood Transfusion has marked curative value (p. 8.) *See also Tissue Extract* (p. 34). *Also Vol.* 1915, p. 486.

PYELOGRAPHY.

J. W. Thomson Walker, M.B., F.R.C.S.

A number of articles are devoted to consideration of the dangers of pyelography which result from infiltration of the kidney with the fluid injected into the pelvis. Keyes and Mahon¹ describe the appearances presented by such a kidney.

Fatal cases have been recorded by Roessle, von Hoffmann, Krotozyner, and others. Some of them have been due to sepsis or shock, but others have been the direct result of the pyelography as such. In the great majority of cases the infiltration of the kidney has been due to too powerful distention of the renal pelvis with the collargol. Keyes and Mahon hold that injection of the renal pelvis, without distention, may damage the parenchyma, and undertook a series of experiments to prove this statement. They conclude that momentary gentle distention of the normal pelvis of the kidney causes no more damage than a congestion of brief duration; but if the distention persists for a few minutes, the injected fluid is absorbed into the blood-vessels and lymph-spaces about the kidney pelvis, and the appearance of the collargol in the glomeruli and tubules is a secretory phenomenon. These observers discuss the question of secondary or late infiltration where no pain is experienced at the time of the examination; but later the outlet of the pelvis becomes blocked, and distention of the kidney with infiltration of the tubules with collargol results, or, as in one recorded case (von Hoffmann) rupture of the distended pelvis may occur. Keyes and Mahon hold that this secondary retention is the cause of most of the deaths that have been reported from pyelography.

Eisendrath² carried out a series of experiments which support the now generally accepted view that infiltration of the kidney results from over-distention of the pelvis. Eisendrath states that the injection of collargol under a pressure not exceeding 30 mm. will fill the

renal pelvis, and only a minimum amount of collargol enters the kidney parenchyma or infiltrates the peripelvic tissue. An elevation of $3\frac{1}{2}$ feet of a column of fluid causes it to flow at a pressure of 29 mm. In his first series of experiments the amount of collargol injected did not exceed the capacity of the renal pelvis, only sufficient pressure being used to distend it slightly. Practically no deposits were found in the kidney, and there was no damage to the renal epithelium. In the second series the pressure and quantity were increased, and collargol was constantly found either in the kidneys or lungs, or both.

Krotoszyner,³ after discussing the untoward results of pyelography, concludes that although pyelography is justly considered to be a valuable method of diagnosis in some renal lesions, a correct diagnosis of the great majority of surgical diseases of the kidney is possible without it. It is accepted that danger may arise even when the examination is carried out with every care. Its use should therefore be restricted to those comparatively rare cases in which the correct recognition of a renal lesion by other methods is impossible.

Burger⁴ attaches importance to the thorough evacuation of the renal pelvis through the ureteral catheter, and subsequent washing of the renal pelvis with saline solution or boracic acid. Crowell, judging from the examination of a case and from experiments on dogs, considers that collargol is irritating and causes damage to the kidney, and holds that further search should be made for a less harmful substance.

Luckett and Friedinan⁵ suggest the use of pyelography in the *diagnosis of injury to the kidney*. They believe that positive information can be obtained as to the extent of the laceration of the kidney substance, whether it is an intracapsular injury, or whether the capsule has been torn through. Conclusions can be arrived at as to whether surgical interference will be necessary, without waiting for secondary symptoms. "Even while injecting the collargol an idea may be gained, given a normal kidney pelvis, whether a great deal of laceration of kidney substance has occurred, or if the capsule is torn through; this is determined by the amount of fluid that can be injected without giving the patient pain, it being a safe presumption, if more than 20 to 25 c.c. of collargol is used, either that there is great pulpification of the kidney substance, or that the capsule is ruptured, thereby allowing dissemination into the perirenal space.

E. L. Young⁶ discusses the *fluids used for pyelography*. Collargol is generally recognized as causing lesions of the kidneys, and attempts to prevent this result have all been directed to improvement in technique. Only two other substances have been successfully used as substitutes for collargol. Cargentos, a colloidal solution of silver oxide, has given good results in some cases. Kelly and Lewis used a 5 per cent emulsion of silver iodide. They claimed that it was non-irritating and gave a good shadow. Others who tried it found it unsatisfactory, for when the mucilage was sufficiently stiff to hold

the iodide in suspension it was too stiff to use. A 5 per cent suspension of silver iodide throws a better shadow than a 10 per cent col-largol solution. Young believed that the main difficulty in regard to its use lay in the vehicle for the suspension, and Godsol produced for him the following formula: Quince seed, 100 gr.; water, 8 oz.: macerate for twenty-four hours, with frequent agitation. Do not crush the seed. Strain through cloth. Add 2 per cent boric acid solution. As this does not make good mucilage, sufficient of this mucilage is added to 12½ c.c. of argentide to make 50 c.c., and is vigorously shaken for two minutes. The resulting emulsion lasts several weeks, and is a thin, clear fluid, flowing readily through a ureteral catheter. Experiments on dogs showed that the emulsion, although not entirely non-irritating, as claimed by Kelly and Lewis, is non-absorbable, and hence only slightly irritating.

Burns⁷ holds that the ideal solution for use in pyelography must be non-toxic, non-irritating, quite fluid, and must present the greatest possible degree of opacity to the Röntgen rays. Various colloidal solutions of the heavy metals, such as iron, silver, bismuth, copper, and lead, and suspensions of the salts of bismuth, calcium, and magnesium have been tried. All of these solutions sediment on standing and are viscous, while some are toxic and irritating. Thorium nitrate is unsuitable for use, because it is irritating, markedly astringent, and precipitates insoluble salts in the urine. The neutral solution of thorium nitrate and sodium citrate possesses, so far as present experience goes, all the necessary characters for use in pyelography. This solution is fluid, quite clear, clean, and does not stain clothing. The solutions used contain 10 per cent and 15 per cent thorium nitrate, and are made in the following way: To make 100 c.c. of a 10 per cent solution, 10 grams of thorium nitrate are dissolved in as little distilled water as possible; to this solution—kept hot in a water or steam bath—are added 30 c.c. of a 50 per cent solution of sodium citrate, the addition being made in small quantities, and care being taken to shake the solution thoroughly after each addition. The solution is then made neutral to litmus by the addition of a normal solution of sodium hydroxide, and made up to the required volume of 100 c.c. with distilled water. On filtration, a clear limpid solution is obtained which, when sterilized either by boiling or by steam under pressure, is ready for use. This solution is non-irritating to mucous or peritoneal surfaces, does not precipitate salts in the urine, and can be injected intravenously up to 1.5 c.c. per kilo of body weight, and given by stomach up to 4 c.c. per kilo of body weight, in dogs, without causing any change in the phenolsulphonephthalein content, or cellular elements of the blood.

See also Vol. 1915, p. 490.

REFERENCES.—¹*Amer. Jour. Med. Sci.* 1915, i, 30; ²*Jour. Amer. Med. Assoc.* 1915, i, 128; ³*Surg. Gyn. and Obst.* 1914, ii, 522; ⁴*Ibid.* 536; ⁵*Ann. Surg.* 1914, ii, 729; ⁶*Boston Med. and Surg. Jour.* 1915, i, 539; ⁷*Jour. Amer. Med. Assoc.* 1915, i, 2126.

CONGENITAL STENOSIS OF THE PYLORUS



Fig. A.—Anterior aspect of the unopened stomach, showing appearance of pylorus.

Fig. B—Posterior surface of the stomach, showing gastrectomostomy.

DICAL ANAL, 1916

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PLATE XXIX.

CONGENITAL STENOSIS OF THE PYLORUS—continued

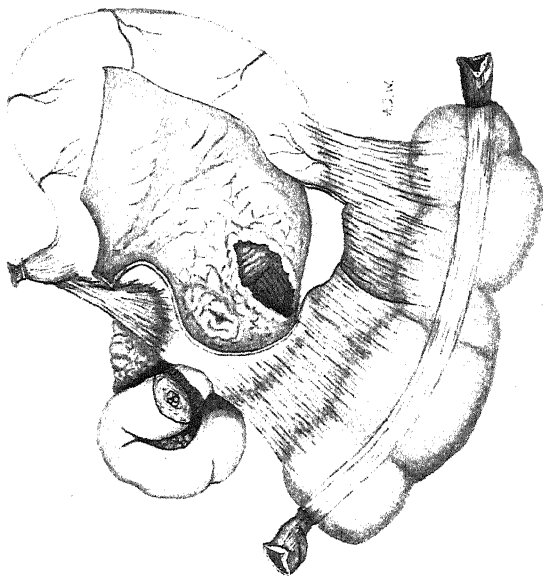


Fig. C.—Anterior aspect of the opened stomach, showing the condition of pylorus and gastrojejunostomy opening.

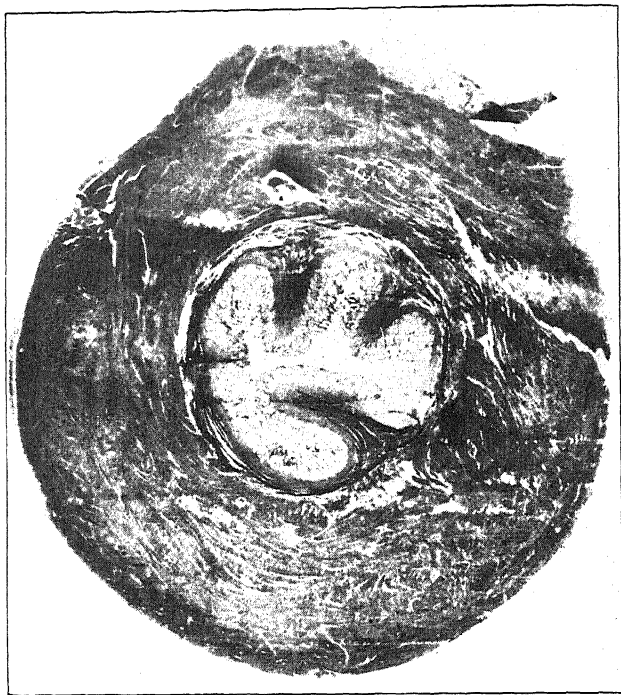


Fig. D.—Cross-section through the pylorus, showing hypertrophied musculature and connective tissue. Mucous membrane is thrown into folds. It is redundant, and if the pressure of the hypertrophied muscle were removed, the lumen of the pylorus would be re-established. The pyloric orifice is reduced to a small slit, through which a small probe may be passed.

PYLORUS, CONGENITAL STENOSIS OF.

Frederick Langmead, M.D., F.R.C.P.

Walton¹ gives a full summary of our present state of knowledge of this disease, and records a case in which death took place from an intercurrent condition seven months after gastrojejunostomy (*Plates XXXVIII, XXXIX*). Operation had been successful in relieving symptoms, and post mortem a wide channel between the stomach and jejunum was found; the thickening of the pylorus, however, was as marked as at the time of the operation, and the canal was impervious to the passage of water. Similar instances of the persistence of the hypertrophy after apparent cure of the condition have been reported by Batten after medical treatment, and by Mosse, Murphy, and Wohlbach after surgical. D. Lewis and C. G. Grulee² add yet another. The child died eight months after gastro-enterostomy, and at autopsy enormous hypertrophy of the pyloric musculature was found, whilst the pylorus admitted only a fine probe (*Plate XXXIX, Fig. D*). Such examples show that relief of symptoms, whether by medical or surgical means, is not necessarily due to absorption of the pyloric tumour. Although they indicate that the pyloric hypertrophy is not the deciding factor in prognosis, they are regarded by most of those who record them as implying the need for surgical treatment. Little has been added to the symptomatology of the disease. As Walton says, "the forcible and projectile vomiting, the marked wasting in spite of the most careful dieting, and the obstinate constipation make the diagnosis clear" when they occur in a baby a few weeks old. "In more advanced cases, the visible peristalsis, and the dilatation of the stomach, with the possible presence of a tumour, prevent any possibility of doubt."

C. H. Miller³ reports a new series of 9 cases, 5 of which were of females and 4 of males. This is contrary to the general experience, for Hutchison states that 80 per cent of the cases occur in boys, and Still, in his published series of 20 cases, included only 3 females. The earliest symptom is usually vomiting, and its onset is most commonly during the second or third week. The repeated projectile vomiting and consequent wasting generally bring the child under medical observation within a few weeks of birth. There are, however, occasional mild cases where the symptoms are slight and the weight is little affected for several weeks. One of Miller's cases came under treatment at eighteen weeks, and the writer has met with a similar one. A palpable pyloric tumour has always been acknowledged as one of the most convincing signs, but Miller holds the unusual view that palpability of the pylorus is a sign of wasting rather than of pyloric hypertrophy.

TREATMENT.—The question as to whether the treatment should be medical or surgical has not yet progressed beyond the stage when an open mind is the only reasonable attitude. Dogmatism has been rife in favour of each side, but although it has added to the zest of the debate, it has done little to hasten the decision. Walton has

collected from the literature many of the statistics which have been published to support each view. Thus, in favour of medical treatment, Hutchison records that of 20 cases treated at home, 17 recovered. At the Hospital for Sick Children, Great Ormond Street, however, where medical treatment alone was adopted, there was a mortality of 78 per cent in 64 cases, which he ascribes to the fact that at hospital they are seen at a later stage. He believes that, in some cases at least, the cure is both complete and permanent, and mentions cases examined five years after treatment with no return of symptoms. In one, however, there was still dilatation of the stomach three years after apparent recovery, and he suggests that some cases which have been described in adults may have originated in this way. Supporting this suggestion are two cases described by Barling of patients of the age of twenty-seven and seventeen years respectively, where the characteristic appearance of the congenital type of lesion was seen. Pearse has reported the case of a child one month old who was cured by medical treatment, and who had been followed up for a year afterwards and remained cured. Still, writing of medical treatment, states that, excluding three cases dealt with before modern methods came into vogue, and three further cases which were lost sight of, there were 19 recoveries out of 36—a mortality of 47 per cent. Heubner, Starck, Block, and Bendix have between them reported 71 cases treated on medical lines, of which 66 recovered. To these must be added Miller's series of 9, of which 6 recovered, 5 becoming apparently normal children, and the other being still under treatment when his article was published: of the 3 fatalities, 1 patient died from fits and 1 was moribund when the treatment was begun. Some of these children had been transferred by a surgeon because they were too ill for operative treatment.

On the other side of the question are the results of a series of 23 cases, to the records of which Walton himself had access; 19 were treated by medical means alone, and of these 18 died, whereas 4 were treated surgically, with 2 recoveries. These were, however, hospital cases, among which a high mortality under medical treatment would be expected, as indicated by Hutchison. Scudder, writing strongly in favour of operative treatment, stated that in his experience the mortality with medical treatment is between 80 and 90 per cent, and quotes the imperfect results of some so-called medical cures. Of three such patients, one at the age of two-and-a-half years was a rachitic dwarf; a second, grown to childhood, vomited all solid food; and a third, at the age of six, lived entirely on fluids. The same writer reports 33 cases, treated surgically, of which only 3 ended fatally. Downes published two cases treated by gastro-enterostomy, both successfully; Bunts 7 cases, 3 of which were fatal, all treated by anterior gastro-enterostomy, and Nicoll 3 successful cases, 2 treated by posterior gastro-enterostomy and 1 by pyloroplasty. Nicoll also reported another series of 6, for which he performed pyloroplasty; 1 child died and 5 were cured. Burghard has had 11 recoveries

out of 16 cases. Lendon reported 8 Australian cases, of which 6 died. Out of 23 cases reported by Thomson, 15 died, but he admits that in many of them operative treatment was only employed as a last resource. Cautley, emphasizing the importance of this point, recorded 6 recoveries out of 7 treated in private practice, but a mortality of 4 out of 5 in hospital cases. Later, in a paper with Dent, he advocates pyloroplasty, and reports 50 per cent of recoveries. Grenet, Veau and Sedillot wrote of a case successfully operated upon at the age of two months. Fredet and Tixier mention the after-results of operative treatment. One child operated upon at the age of two months was in perfect health at five-and-a-quarter years. Another, surgically treated by posterior pyloroplasty at the thirteenth day of age, required lateral anastomosis later because of the establishment of a vicious circle, but perfectly recovered and remained in good health at 109 days old—the time of publication. On the other hand, Sarvnot collected 23 recorded operative cases, with death in 13 and recoveries in 10.

Walton thinks it essential that all showing a definite pyloric tumour should obtain early surgical intervention, and for the others suggests that medical treatment should be limited to two weeks if the child is progressing unfavourably, and to three weeks if the child is holding its own.

METHOD OF TREATMENT.—1. *Medical.*—(See MEDICAL ANNUAL, 1915, p. 498). According to most authorities three essential parts of the treatment are **Warmth, Gastric Lavage, and Careful Feeding.** Miller advises that feeding should be with predigested milk. To attain the first he has found that the most satisfactory way is to put the baby, all but its head, into a hot-air bath, arranged in an ordinary cot. This is done by draping a fracture cradle with pieces of blanket, and hanging inside it an electric lamp and a thermometer. For washing out the stomach he prefers warm tap-water, with the occasional use of bicarbonate of soda or citrate of potash, but has given up the constant use of these solutions, since he found that after a few days they caused diarrhœa. The predigested milk, he advises, should be given a teaspoonful at a time every half-hour, and afterwards the interval and quantity may be increased. Virol and albulactin he has found to be useful additions later, when improvement has commenced. For colic and abdominal tenderness he gives **Tinct. Opii** ($\frac{1}{4}$ min.) or **Chlorodyne** (1 min.) three times daily for two or three days. Belladonna he considers useless.

2. *Surgical.*—Four operative measures have been advocated—gastro-enterostomy, divulsion, pyloroplasty, and pylorectomy. Each retains its adherents, except perhaps pylorectomy, which has been fatal in every case in the hands of Scudder, Ibrahims, and Fisk. Walton strongly favours gastro-enterostomy as an operation which, being more familiar to the majority of surgeons, is more likely to be performed rapidly. Accessory forms of treatment are important in his opinion. Saline per rectum, once hourly for six or eight hours

before operation and for as long afterwards, will do much to bring about a successful result. One or two ounces of sterile saline may also be left in the peritoneal cavity. Immediately after operation a small feed of peptonized milk should be administered by the mouth. Afterwards, since great care in feeding is essential, the surgeon should, whenever possible, work in conjunction with the physician, so that adequate attention be given to the details of after-treatment.

REFERENCES.—¹*Ann. Surg.* 1914, ii, 392; ²*Jour. Amer. Med. Assoc.* 1915, i, 410; ³*Lancet*, 1914, ii, 987.

PYORRHOEA ALVEOLARIS.

Robert Hutchison, M.D., F.R.C.P.

The most important advance in our knowledge of oral sepsis is the discovery made by M. F. Barrett and Allen J. Smith,¹ in 1914, that pyorrhœa alveolaris is caused by a specific amœba—the *Entamœba buccalis*. Their work has been confirmed in the study of a large number of cases by Bass and Johns² and by Evans and Middleton.³ The former writers describe in detail the methods of demonstrating the entamœba in pus from the tooth pockets and its staining reactions.

As a natural corollary to this discovery, **Emetine** has been employed in the treatment of pyorrhœa in the same way as in that of amœbic dysentery, and with apparently complete success. The dose is $\frac{1}{2}$ gr. given hypodermically every day. The gums may also be swabbed twice a day with **Vin. Ipecac.** Entamœbas disappear from all lesions in 99 per cent of the cases after six days' treatment, but in order to prevent relapses the emetine course should be repeated once or twice at intervals of three or four weeks.

Wright and White⁴ have also reported very successful results in the treatment of pyorrhœa by intramuscular injections of **Mercuric Succinimide** in doses of 1 gr. (rather less in females) every seventh day. Four or five injections are usually sufficient to effect a cure. Local dental treatment on the ordinary lines must be carried out as well.

Stewart,⁵ whilst admitting that amœbas are the primary cause of pyorrhœa, considers that the actual production of pus is the result of a mixed infection in which various types of bacteria may take part. He therefore finds a place for **Vaccines** in treatment as well as for the use of emetine. Hartzell and Henrici⁶ conclude from their own bacteriological observations that streptococci of the *viridans* group are constantly present in periodontal suppurative lesions, and believe that these may be the cause of the remote secondary changes met with in the subjects of pyorrhœa.

McKisack,⁷ however, does not consider that a convincing case has been made out for the view that a septic state of the mouth is a common cause of remote disorders, although he admits that it is always a source of danger. He thinks that the extreme views which have prevailed on the subject are now becoming moderated. As regards treatment, caries of the teeth must not be allowed to go on. In the earlier stages of gingival inflammation, careful attention to the state

of the gums and the application of suitable antiseptics work wonders. Later, when deeper pockets have formed, thorough drainage of the little abscesses and ulcers and frequent cleansing of the septic surfaces may result in a cure. This is denied by some, who state that when once a definite pocket has formed there is nothing for it but to remove the tooth. So long as there is a source of poisoning, they say, which is difficult to remove by mild measures, and which in the meantime is producing arthritis and other maladies, we must have no mercy on the tooth. This is not a sound practice. Before resorting to the sacrifice of a tooth one must make a persevering attempt by local treatment, vaccines, change of air, tonics, etc., to effect a cure. In the advanced stages of pyorrhœa alveolaris, where there is not merely destruction of the dental periosteum, but where the bone is seriously diseased, there is no hope of any treatment which does not include extraction of the teeth which are involved. Scrupulous care should be given to the thorough cleansing of all artificial teeth and other fittings and foreign bodies in the mouth.

Emetine said to be a specific (*p.* 18).

REFERENCES.—¹*Dent. Cosmos*, 1914, 948; ²*Jour. Amer. Med. Assoc.* 1915, ii, 553; ³*Ibid.* 422; ⁴*Med. Rec.* 1915, ii, 424; ⁵*Med. Press and Circ.* 1915, ii, 280; ⁶*Jour. Amer. Med. Assoc.* 1915, i, 1055; ⁷*Brit. Med. Jour.* 1915, i, 453.

PYOSIS CORLETTI.

Sir Leonard Rogers, M.D., F.R.C.P.

A. J. Chalmers and A. P. O'Connor¹ describe under this term an eruption met with among British troops at Khartum, which is readily amenable to **Vaccine** treatment. In 1889, Manson, in Hong Kong, described pyosis due to a diplococcus. In 1899, Corletti described a contagious bullous eruption, usually commencing on the face or hands and spreading widely over the body. A little epidemic of this recently occurred at Khartum in which a diplococcus was found in large numbers in the fluid of the vesicles and in the base of the bullæ. It is Gram-positive and grows readily on ordinary culture media. As it was the only organism present, a vaccine was made from it and given in doses of 250 to 450 millions at two- and three-day intervals, while the bullæ were pricked and the contents disinfected with swabs of 1-1000 perchloride of mercury and dusted with a mild antiseptic powder, with excellent results.

[For several years past the writer has successfully treated a number of very similar cases in Calcutta by vaccines made from cultures from the vesicles and blisters of a similar disease.—L. R.]

REFERENCE.—¹*Jour. Trop. Med. and Hyg.* 1915, 73.

RABIES.

J. Ramsay Hunt, M.D.

Rabies has been eradicated in Great Britain, both in human beings and in animals, the measures adopted being merely the muzzling of all dogs and prohibition of the importation of canines except after a quarantine sufficiently long to prevent the admission of a rabid animal to the island. Unfortunately, in the United States, owing to state laws, general muzzling of all dogs is impossible, and rabid dogs

may pass from one state to another, spreading the disease so that eradication by this means seems impossible, for the present at least.

The question of the diagnosis in animals and its prevention in man has been investigated by R. M. Le Comte.¹ If the animal shows no symptoms in fourteen days, there is no danger of the person bitten contracting rabies from that bite, while if symptoms appear or the animal dies from rabies within a week or ten days, the Pasteur treatment may be started at once without reference to laboratory diagnosis, although the latter may still be utilized to make the diagnosis doubly sure.

In man, the disease is commonly divided into two stages—*excitement* and *paralysis*—which follow one another in the order named but without strict regularity in this respect. The fear of water, which is due to spasm of the glottis from the laryngeal irritation occasioned by swallowing and the condition of general hypersensitiveness during the stage of excitement, or to choking from the entrance of fluids into the larynx during the paralytic stage, is quite characteristic. This spasm, or paralysis of the laryngeal muscles, also gives rise to the peculiar sound, resembling the barking of a dog, when the patient attempts to speak. A positive diagnosis is probably seldom made until after death, except in those cases in which symptoms follow a bite from an animal definitely known to be rabid.

A rapid diagnosis of the condition in the laboratory depends on the recognition of Negri bodies in the nerve-cells of the brain of the animal. A difficulty arises from the appearance in the brain soon after death of artefacts which are indistinguishable from Negri bodies by microscopic methods, if the brain has not been properly cared for. It is with a view of diminishing the latter difficulty that careful methods of preparation are imperative. In hot weather, and at all times of the year when material has to be despatched from points that are more than two hours distant from the laboratory, it is best to put it in a clean metal can or box, to solder it to prevent leakage or contamination, and to place it for transport in the centre of a box filled with ice. If the material can be delivered at the laboratory within two hours after the death of the animal, it is best to forward the head and neck with as little anatomical disturbance of the parts as possible. When despatching from points estimated to be more than six hours distant from the laboratory, in order to insure a diagnosis within a week, it is best to remove the brain, to bisect it in the middle line, and place one half in sterile glycerin and the other half in a 10 per cent solution of formaldehyde gas. Although this method of preservation prevents the diagnosis from the fresh tissue, it will obviate difficulties arising from decomposition and bacterial contamination, and the part in formaldehyde solution can be readily manipulated so as to give a diagnosis within a week at most.

Any wound in which there is a suspicion that the animal inflicting it may have been rabid, should be freely opened and thoroughly cauterized with fuming nitric acid. This procedure may not destroy

all the virus present in the wound, but it will lengthen the period of incubation by reducing the amount of the virus left to be absorbed, and will bring the possibility of failure in subsequent immunization to a minimum.

Concerning the advisability of the Pasteur treatment, but little need be said. Failures are less than 1 per cent in those receiving it, while in untreated cases developing rabies the mortality is 100 per cent, and is estimated at above 20 per cent of all persons bitten by rabid dogs. The incubation period of the disease is from fourteen to a hundred days, the average being about fifty, and if treatment is started within one week after the bite has been inflicted, little fear of failure need be entertained.

Serodiagnostics of Rabies.—Any method which would facilitate the making of early diagnosis in cases of rabies is much to be desired. M. G. Wohl² has applied the principle of the Abderhalden method to this disease. As a result of these investigations, which are only preliminary, he believes that the Abderhalden reaction might be utilized for diagnostic purposes in rabies. The reaction is positive as early as the third day in rabbits subdurally inoculated with fixed virus. Sera of healthy rabbits cause cleavage of brain and placenta tissue, yet to a very light degree.

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1914, ii, 1658; ²*Amer. Jour. Med. Sci.* 1915, i, 427.

RAYNAUD'S DISEASE.

J. Ramsay Hunt, M.D.

Raynaud's disease, or symmetrical gangrene of the extremities, is a vasomotor neurosis, characterized by a tendency to recurrent attacks of vascular spasm, especially of smaller vessels, the arterioles and venules. Pathological investigations fail to show primary disease of the vessel wall, and if such changes are present, they occur late and are secondary. The simplest form of this disease is represented by cold hands or feet, or by a finger or toe becoming stone-cold, termed 'dead finger' or 'dead toe.' The obstruction to the circulation may attack several fingers or the whole hand, the whole foot, the nose, an ear, or there may be serious blood-vessel disturbances of the internal organs of the body. The first local symptom is coldness and anæmia, with or without pain, followed perhaps by an asphyxia or a darkening of the part; and later a hyperæmia may occur, with flushing and increased local circulation. This symptom-complex may recur and continue to recur in the same fingers or toes. There are often pigmentations, mottling, and brown spots on the skin on various parts of the body.

In a few instances it is the cause of various abdominal disturbances, as also of the nervous system. There may be a spasm of the retinal vessels and temporary loss of vision; there may be loss of hearing, and the senses of taste and smell may be affected by the contraction of the blood-vessels, which may also lead to loss of speech, dizziness, paralysis, psychic changes, epilepsy, and cataleptic symptoms.

O. T. Osborne¹ contributes an interesting clinical study of this disease, and refers it to a disturbance of the internal secretions, especially of the thyroid and suprarenal, possibly the ovary as well. He outlines the various types of the clinical picture as follows: It may be so mild as not to be recognized. Such patients have cold hands and feet, irregular pains in various parts of the body, and they are cold in winter and hot in summer (vasomotor ataxia, as it has been termed). There may be so much contraction of the peripheral blood-vessels that the internal vessels, especially the abdominal, are dilated, and frequently diarrhœa is caused, sometimes termed 'intestinal sweating,' from which cause a patient may have a morning diarrhœa without other symptoms. Or, there may be such abdominal congestion as to cause various other gastro-intestinal disturbances, albuminuria, etc. This kind of congestion or spasmodic contraction of blood-vessels is probably often the cause of ovarialgias, delayed and painful menstruation, and menorrhagia. There are cases of medium severity in which there are ice-cold hands and feet, chilblains of varying degrees, sore fingers and toes, suppurations around the nails, perhaps severe headaches, and there may be erythromelalgic symptoms of red face and red hands, with or without pain. There may be faintness or syncope, dizziness, some slight nervous disturbances, as of the eyes, and recurrent albuminuria or hæmaturia. This condition may be one of the causes of albuminuria of adolescence and of orthostatic albuminuria. In severe cases, occurring less frequently, there may be serious heart disturbances, deep ulcerations of the fingers and toes, serious cerebral symptoms, or severe abdominal symptoms. There may occur, very rarely, such serious and uncontrollable spasms of the blood-vessels as to cause gangrene and sloughing of parts of the extremities.

It is to be differentiated from erythromelalgia, obliterative endarteritis, embolism of terminal vessels, and angioneuritic œdema. Mild ergot poisoning may also simulate Raynaud's syndrome.

TREATMENT.—Osborne recommends the use of **Nitroglycerin**, the local application of **Heat**, and especially the use of **Thyroid Extract**. He believes that this latter remedy will benefit most of the cases and will sometimes effect a cure.

REFERENCE.—¹*Amer. Jour. Med. Sci.* 1915, ii, 157.

RECTUM, CANCER OF.

For employment of **Radium** in treatment, see p. 63; see also Vol. 1915, p. 500.

RELAPSING FEVER.

Salvarsan said to be very effective (p. 28).

RHEUMATIC FEVER.

Herbert French, M.D., F.R.C.P.

The fact that **Salicylates** in rheumatic fever do practically nothing towards curing the disease is apt to be lost sight of. What salicylates do is to bring down the temperature and relieve the joint pains—an

immense boon to the patient ; but the pains will recur if the salicylates are stopped, up to a period which is approximately the same as used to be the case before salicylates were employed. This drug is to the joint pains of rheumatic fever as bromide of potassium is to the fits of epilepsy ; in neither case is the disease cured by the drug, but the latter makes the malady more endurable. It is, however, probable that the mere fact that salicylates relieve the joint pains renders the severity of the subsequent valvular heart disease even greater than before ; for endocarditis is not prevented by salicylates, and some patients who would rest in bed longer if they were in pain, get up and add unnecessary strain to their inflamed heart valves when, not being in pain, they believe that they are cured of their acute rheumatism. The period of stay in hospital of patients receiving salicylate and of those receiving other forms of treatment is practically the same, as the figures collected by Miller¹ show.

Heyn² advocates the giving of sodium salicylate by rectal injection ; he has shown that one can thus give as much as 24 grams per diem, and that it is well absorbed. [There seems little advantage in rectal over oral administration, at any rate as regards the great majority of cases. It is true that bigger quantities can be given per rectum than by the mouth ; but most patients do not need larger doses than their stomachs can deal with, and the rectal method of administration does not obviate tinnitus and excessive perspirations.—H. F.]

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1914, ii, 1107 ; ²*Ibid.* 1004.

RHEUMATIC HEART DISEASE. *Carey Coombs, M.D., M.R.C.P.*

SYMPTOMS.—Naish and Kennedy¹ report two examples of heart-block in acute rheumatic carditis. In one of these, inflammatory foci were found in the auriculo-ventricular bundle. The number of recorded cases of heart-block in acute rheumatic heart disease is small considering the wide prevalence of the disease.

TREATMENT.—It is probable that many of the cases of chronic valvular disease which constitute so familiar and painful a feature of our hospital wards, might have been prevented if the patients had been subjected to continuous and careful supervision in the earlier, childhood phases of the disease, during the period when the foundations of permanent injury are being laid by active rheumatic infection. This is rendered difficult by the long and wearisome nature of the disease, by its insidious and undemonstrative nature, and by the migratory habits of the poorer classes, among whom the great majority of the patients are to be found. An interesting attempt to grapple with these difficulties is being organized in Boston, U.S.A. This is described in papers by Eustis,² Welsh,³ and Young.⁴ A less ambitious project on the same lines is reported by Barton,⁵ writing in this country. The American plan consists of a special out-patient clinic in which children who appear to have the beginnings of acute rheumatic carditis are carefully examined. Continuity of observation and treatment are secured by giving control of the clinic to one

particular physician, and above all by the co-operation of a whole-time social worker. This latter visits the children at home, gets an understanding of the conditions under which they live, and brings an account of them to the physician in charge, and also sees that his recommendations are carried out (as to rest, exercise, food, clothing, and so on). A point emphasized by these workers is the necessity for catching the cases early. To this end every case of rheumatism, tonsillitis, or chorea is regarded as a potential case of carditis, and observed and treated from this point of view. They find home treatment adequate as a rule, under these conditions. Institutional care is only called for under special circumstances. As a result of nine months' work they claim to have saved 75 per cent of their cases from receiving permanent cardiac damage during that time. An important feature of their scheme is, that as the children whose hearts are damaged reach adolescence, they are passed on to the care of a physician, who thus takes charge of the case forearmed with a knowledge of what has already happened to the child. They also make a point of securing suitable employment for these cardiac cripples. • This is the chief feature of the English work described by Barton. Boys recovering from acute carditis are sent to his home from several of the London hospitals, and he makes it his business to secure suitable work for them, as far as this is possible.

One interesting feature of the Boston work is the observation, reported by Young, as to the value of tonsillectomy in the rheumatic child as a preventive of recurrence of infection. His experience has been far from encouraging, since in more than half the cases relapse has occurred, while in two instances the operation was followed by an immediate recrudescence of the infection.

REFERENCES.—¹*Lancet*, 1914, ii, 1242; ²*Boston Med. and Surg. Jour.* 1913, ii, 348; ³*Ibid.* 352; ⁴*Ibid.* 356; ⁵*Lancet*, 1915, ii, 602.

RHEUMATISM IN CHILDREN. *Frederick Langmead, M.D., F.R.C.P.*

The devastating effect of acute rheumatism in childhood has been gradually brought to the knowledge of the profession, until its protean manifestations and serious results have at length been generally accepted. Mary H. Williams¹ does not exaggerate its importance when she states her belief that in England as much misery is caused by it as by tuberculosis, and perhaps more. During her work in the schools she has had an opportunity of watching rheumatic children for five and seven years or longer, and noting how one condition precedes and passes into another. She did not utilize the abundant literature on the subject, so that her conclusions were based on independent and unprejudiced observation.

In young girls, aching of the legs (growing pains), which occurs both by night and by day, is, in her opinion, almost always due to rheumatism. In boys, she thinks that a certain amount of aching can be caused by strenuous games, even apart from rheumatism, but that rheumatic pains themselves are generally worse after exercise,

and at first may occur only after it. In many instances they are worse at night, or coincide generally or invariably with wet weather. Either relationship indicates that they are rheumatic. Aching of the legs due to syphilis she regards as rare, and that accompanying menstruation as easily distinguished by a little questioning.

She found that the rheumatic child is recognizable before the onset of 'growing pains,' and can often be distinguished at the age of five, and perhaps earlier. No complaint is made of the condition by the mother, except perhaps of poorness of appetite or of nervousness. The child is always fidgeting, however, making slight quick, jerky movements, and, under examination, the pulse-rate is found to be increased—often 100 per minute or over. Later, when seen as older children, those in whom the pulse-rate has been noted as rapid when they were five years old, are found to be definitely rheumatic. This tachycardia persists for several years, varying little in degree. Slight continued pyrexia (99.4 to 100.4°) is frequently met with as well. This might have been ascribed to nervousness, but some 5000 temperature records were obtained, and, as a rule, it was the same when taken again the second time. Like the increased pulse-rate, it varies little throughout school life. In a few of the children examined at the age of five, growing pains were already in evidence, but in them the rheumatism was of a more severe form, in her estimation.

The heart's impulse is often visible over a large area, and the apex-beat outside the nipple line. This, she thinks, has led to the difference of opinion which exists as to whether the apex-beat in children is normally within or without this position. In some cases the cardiac sounds are altered, being muffled in character, but definite bruits are seldom heard. At this stage, the myocardium is probably the part affected, and little permanent change remains. Another common symptom met with between the ages of five and twelve is abdominal pain, which in some cases may indicate appendicitis, though generally labelled 'bilious attack.' She holds that 'bilious attacks' in children often precede definite appendicitis, that they are often in reality slight attacks of that malady, and that both 'bilious attacks' and appendicitis are more frequent in rheumatic children, or in persons with a rheumatic history. This clinical observation accords with the work of Poynton and Paine, who produced appendicitis in young rabbits by intravenous inoculation with organisms obtained from a case of rheumatic fever.

This writer is convinced that chorea is a manifestation of rheumatism. Among several thousands of cases which she regarded as rheumatic were included some in which chorea appeared, whilst on the other hand she had seen no case of chorea occurring in any but a rheumatic child.

Concerning the relationship between tuberculosis and rheumatism, she holds the view that these diseases are antagonistic, and not active at the same time in the same child. Predisposition to rheumatism is markedly hereditary; but, in addition, rheumatism in the parent

appears to protect the child to a definite degree from pulmonary tuberculosis.

She believes that heart disease in children is practically always rheumatic. "If we trust more to our eyes and our fingers we shall. I hope, soon cease to talk of functional disease of the heart," is her dictum. She regards as the primary cause of the 'simple anæmias' of adolescence, the continuous action of small doses of the rheumatic toxin, the environmental conditions supposed to be responsible for these anæmias merely enhancing the action of the toxin, so that symptoms are produced.

REFERENCE.—¹*Lancet*, 1915, i, 1284.

RHEUMATOID ARTHRITIS. (*Vol.* 1915, *p.* 508.)

RHINOSPORIDIUM KINEALYI. *Sir Leonard Rogers, M.D., F.R.C.P.*

T. S. Tirumurti¹ records his experience of this disease in Madras, where, in addition to the ordinary form of papillomatous tumour in the anterior nares, he has met with the parasite in tumours of the nasopharynx, bulbar conjunctiva, lower eyelid, and on the penis. He describes the microscopical characters of the parasites, and attempted without success to inoculate animals with the growth. The growths tend to recur even when their bases have been cauterized.

REFERENCE.—¹*Pract.* 1914, ii, 704.

RHIZOTOMY.

J. Ramsay Hunt, M.D.

The operation of the division of the posterior spinal roots, first performed by Abbe in 1888, has within recent years had its scope very greatly increased by the work of Foerster.¹ The latter has clearly proved that it is a most potent agent in the abolition of spasm associated with spinal lateral sclerosis and in the relief of the visceral crises of tabes. Notwithstanding the size of the available statistics, opinions are still at variance as to the value and results of this operation, many contending that after a time the spasticity recurs, or that the favourable results are no more than would be expected after massage and educative treatments if given alone for a sufficient time. In order to throw light on this important question, and bring together as large an amount of material for analysis as possible, this subject has been presented by various authors in a series of articles under a common title in the *British Journal of Surgery*,² and their joint results correlated and summarized.

1. *Spastic Paralysis of Cerebral Origin*.—These cases are mostly of Little's disease, and include 34 cases, of which 22 were improved, 8 left unaltered, and 4 died. Among the 22 successful cases the mental condition is noted in 18, intelligence being good in 11, whilst in 7 it was defective. The importance of this point is quite manifest, for since the section of the nerves is merely a preliminary to education, it is certain that the latter can only be carried out well with intelligent children. But the fact that improvement

occurred in seven cases of defective intelligence, proves on the other hand that mental deficiency is not an absolute bar to some degree of success. The mere possibility of standing and walking a little has often been observed to have a most beneficial effect upon the intelligence of a defective child. The failures were eight in number. Two of these must be placed in a different category to the others because they concern spastic contraction of the fingers and arm. It seems clear that these derive a very temporary relief from root resection, in no way comparable to that in the lower limbs. It is important to note that among the failures there is no mention of any case being made worse by the operation. The factors which make for success in the selection of cases of Little's disease for this operation seem to be : Early age, i.e., between four and ten ; normal mental condition ; the preservation of good power of voluntary movement in the absence of spasm, and *a fortiori* the absence of marked muscle wasting. It is important to decide whether the exact determination of the roots, with the conservation of certain of them, is necessary. Foerster says that this is so, and he gives as his reason that if the reflex which brings about the extension of the knee is lost, the patient cannot stand. For this, he says, we must preserve the fourth root, but he admits that very often it is the third and not the fourth which fulfils this function.

2. *Spastic Paralysis of Spinal Origin*.—Of these, there were 4 cases with no deaths, and satisfactory relief of painful spasm in all ; but restoration of ability to walk in 1 only. This may be taken as quite typical of the results to be expected of the operation in this class of disease. It will certainly cure the painful spasms, but it will not restore any degenerated nerves. It is useless in progressive diseases such as multiple sclerosis.

3. *The Gastric Crises of Tabes*.—There are reported 5 cases, with no deaths, 2 failures, and 3 successes, but in only 2 of the latter has sufficient time elapsed since the operation to justify this being definitely stated. Foerster lays down the following principles about the gastric crises of tabes in relation to nerve section. There are two forms of disordered nerve function causing gastric crises : (1) Vagal ; (2) Sympathetic. In the former there is marked nausea, and little or no pain or hyperæsthesia. The proposal of Exner to divide the vagi at the œsophageal end of the stomach has not been followed by a degree of success which justifies its adoption, for this causes motor paralysis of the stomach. Foerster has proposed, and with Tietze carried out in one case, a more ambitious proceeding, viz., the division of the sensory roots of the vagus at their origin from the medulla, leaving the motor roots intact. Unfortunately the patient died. In gastric crises of sympathetic origin there is severe pain, not much nausea, and marked cutaneous hyperæsthesia over the upper abdomen. This is the common type, and for it Foerster would divide the posterior roots from D5 to D12 on both sides. It would seem wise to follow this suggestion if the operation is to be

done, because it involves very little exposure of the cord beyond that caused by a more limited division, and has no ill effects *per se*.

4. *The Relief of Pain*.—There are reported 15 cases, in 1 of which the operation had to be abandoned because of the serious condition of the patient; 2 died, and of the 12 cases left there was a cure in 8 and failure in 4 up to the date of writing. It may be said that for the section of nerve-roots to relieve pain two conditions must obtain, viz., a definite localized lesion causing the pain, and a section of nerve-roots for at least two segments above and below those corresponding with this lesion. The only exception to this is in those cases of herpes or neuralgia affecting a single nerve, where the lesion is probably in the posterior root ganglion itself. Even in such a case it would be more prudent to cut three roots, including one above and one below the affected nerve. In cases of 'functional' pain, or pain of diffuse character, it is doubtful whether the operation should be performed, and its result will always be very uncertain.

In the 58 completed operations there were 6 deaths, which corresponds very closely to the 26 deaths in 267 cases collected by Foerster, giving an approximate mortality of 10 per cent. But an examination of the 6 cases shows pretty clearly the reason of this high mortality, and gives some indication how it may be reduced. All the deaths were due to shock or to septic meningitis, the former occurring within twelve hours of the operation, the latter after some weeks.

REFERENCES.—¹*Ann. Surg.* 1914, ii, 454; ²*Brit. Jour. Surg.* 1914, Oct. 205.

RICKETS.

Frederick Langmead, M.D., F.R.C.P.

ETIOLOGY.—Much of what has been written in recent years tends to overthrow the once generally accepted view that this is a deficiency disease. Poverty of fat or of protein in the diet is regarded by many of less importance than an excess of carbohydrates and the secondary intestinal disorders induced thereby. Others ascribe to the supposed influence of the parathyroid glands on calcium metabolism a very important place as a contributing factor. Another ductless gland, the thymus, has been thought to play a part, this view being based on the evidence obtained by experimental thymectomy in animals, a condition analogous to rickets having been so produced.

As Leonard Findlay¹ points out, although it is now over 300 years since Glisson first described 'the rickets,' the reason why the bones are deficient in calcium still remains obscure. Marfan believes that it is due to auto-intoxication from the alimentary canal, and Moussu, Koch, and others regard it as the result of an infection. Findlay emphasizes the importance of a careful histological examination as a means of recognizing the disease. Careful microscopical examination, he says, has demonstrated two facts: (1) That all examples of spontaneous and experimental rickets in animals described by veterinarians and experimentalists are not identical with the disease as met with in man; (2) That merely naked-eye or chemical examination

of the skeleton has been the cause of a great deal of misconception on the subject. An appreciation of this truth has, however, unfortunately tended to confine interest to the bone changes to the neglect of that of the general metabolism.

By investigation of the calcium metabolism alone, in his opinion, is a true diagnosis possible in the early stages of the disease before gross changes have presented themselves, and he considers that it is the only method by which, during life, the disease can be shown to be active. During this stage more calcium is excreted in the urine and faeces than is ingested with the food. Findlay inclines to the opinion that the bones and tissues are unable to fix the calcium which is brought to them in abundance by the circulating blood, rather than to the belief that an insufficient amount of calcium is absorbed from the intestine, for if an animal be fed on a diet poor in calcium, although the bones become soft, there is a complete absence of the characteristic osteoid tissue. This power of the bones and tissues to retain the calcium he regards as not improbably dependent upon a hormone, possibly that of the thymus gland, as held by Basch, Matti, Klose, and Vogt. That the bone changes described by Matti, produced by thymectomy, are rachitic in nature he concedes, but he hesitates to ascribe them to the removal of the gland. Hart and Nordmann state that so long as the animals are allowed sufficient exercise, no bad effects follow the thymectomy, and Pawlow draws attention to the tendency to softening of bones in dogs subjected to operations for biliary, pancreatic, and intestinal fistulae. Moreover, in rickets and thymectomy the calcium metabolism shows definite differences. In the former the calcium is excreted by the faeces but is diminished in the urine, whereas in the latter, and in starvation and diabetes the chief route of excretion is by the urine.

Findlay holds that a study of calcium metabolism produces evidence against a deficiency of fat in the diet being the cause of the disease, for Freund has shown that milk fat causes an increase in the excretion of the percentage of the calcium of the food, just as occurs in rickets. On the other hand, cod-liver oil has an exactly opposite effect, according to Freund, the known benefit accruing from the use of this food being thus explained. With von Hanseemann, he believes that the disease is induced by confinement. By experimental research he showed that all the animals to which a fat-poor diet had been given developed marasmus, but after death presented no signs of rickets; whereas those allowed a liberal diet of milk and porridge, but deprived of exercise, became markedly rachitic. He cites several instances of which he has heard since his first paper, in the animal world, where confinement or deficient exercise was responsible for the development of rickets, or, at least, of a disease closely resembling it. He has investigated also six points in the life of rachitic children: (1) The length of time the child was breast-fed; (2) The order of the child in the family; (3) The condition of the bowels previous to the onset of the trouble; (4) The amount of air space in the house allowed

to the child ; (5) The number of floors above the ground at which the home was situated ; (6) Whether or not the child had been taken much out of doors. With regard to the length of time the child had been breast-fed, the similarity of the charts constructed from the data obtained on this point in the cases of rachitic and non-rachitic children was so close, that it disposed not only of the idea that want of breast-milk, but also that prolonged suckling is the cause. The statistics obtained did not support the view that intestinal troubles are the source of the affection. Apparently the disease more frequently attacked the earlier than the later members of the family. This incidence, he thinks, may be more apparent than real, since most of the families were composed of only four or five children. The disease occurred as frequently in those on the ground level as in those living three floors up. It might have been supposed, he thinks, that those living highest up, being taken out least, would be most prone to rickets, but he omits to take account of the truth that the most elevated floors of tenement houses, in which the majority of his subjects lived, are generally the most airy. The incidence of the disease was inversely proportionate to the amount of air space allowed to the child. With regard to the amount of time spent out of doors, in the majority of the cases investigated, the mothers confessed to not taking the child out at all.

The results obtained in the treatment of the disease by massage, passive movement, and electricity, were strongly confirmatory of the view that deficient exercise engenders it. In spite of the indications which emerge from this investigation, Findlay has been unable to discover that the disease is more prevalent among peoples like the Esquimaux, who are confined in badly ventilated houses in parts of the world where sunlight is absent for long periods of the year.

J. Priestley² has computed the sex distribution of rickets from observations made during the routine inspection of school children. He thus deals with post-rickety defects rather than with active rickets. Both in the case of marked, and that of slight defects, rickets proved to be more prevalent among boys than girls in a proportion of rather more than 2 to 1.

REFERENCES.—¹*Lancet*, 1915, i, 956 ; ²*Brit. Jour. Child. Dis.* 1915, 173.

RINGWORM.

E. Graham Little, M.D., F.R.C.P.

Hartzell¹ draws attention to the elusive type of ringworm, occurring most usually in the groin, and frequently mistaken for eczema ; it was in fact described as eczema marginatum by Hebra, who gave an admirable picture of its clinical features, although he failed to recognize its parasitic causation, which was first demonstrated by Kobner a few years later. Hebra's classification of this eruption with eczema finds a certain justification in the fact that a secondary eczema is the constant accompaniment of the parasitic invasion, and often completely masks its nature, a feature which is recognized in the modern name,

PLATE XL.

A CASE OF EPIDERMOPHYTON



Dr. Graham Little

eczematoid ringworm. Fresh attention was directed to the nature of the parasite by Sabouraud in 1910, since which date the disease has become more widely recognized, although it is probable that a certain number of cases still escape diagnosis by being classed with eczema. It remains, however, of somewhat rare occurrence. Hartzell reports four cases demonstrated by microscopical findings to be of this nature, and a fifth case in which this causation was suspected but remained unproven. These cases occurred in patients superior to the hospital class, and this is the common experience in London, where hospital clinics have remained singularly exempt from this type of infection. The parasite which is most often demonstrated to be present was differentiated by Sabouraud from the parasites of ringworm by cultural characteristics and by the clinical observation that this parasite never attacks the hair, an observation also made by Hebra, who wrote: "When eczema marginatum attacks hairy parts no alteration is produced in the state of the hairs; they neither change colour, lose their glossy appearance, fall out, nor break off. Nor has anyone ever succeeded in demonstrating the presence of fungus therein." The fungus is found solely in the superficial layer of the epidermis, usually in the groin, and Sabouraud therefore called it the *Epidermophyton inguinale*. While this type is usual, the possibility of the ordinary trichophyton also attacking the same parts as those more particularly affected by the epidermophyton must not be overlooked. Besides the groin and axilla, the fingers and toes are most often the seat of the invasion. In these latter positions the resemblance to an intertriginous eczema is great, and Sabouraud believes that 80 per cent of the cases of so-called eczema of the toes are examples of this infection. (See Plate XL.)

Three clinical varieties of eczematoid ringworm may be differentiated: (1) An acute vesicobullous eruption, with much inflammatory reaction, resembling closely an acute eczema; (2) A more chronic intertriginous eczema type; (3) An inflammation of the soles of the feet and toes, and less frequently the palms, attended by a heaped-up hyperkeratosis, usually very chronic. In both the first and third of these groups it is probable that true trichophytosis may closely simulate the effects of epidermophytosis.

Hartzell has found good results from the use of an ointment recommended by Whitfield, containing 3 per cent **Salicylic Acid** and 5 per cent **Benzoic Acid**. In more obstinate cases the stronger applications recommended by Sabouraud, of lotions or ointments containing 1 to 3 per cent of **Chrysarobin**, may be required. It is of importance to disinfect the clothing which may have come in contact with the disease. Hartzell recites an interesting instance in which a reinfection after cure was ascribed to the use of slippers which had not been disinfected.

Strickler² reports seven cases of ringworm of the scalp treated with **Vaccines** which, after some experiments, were ultimately prepared as follows: Affected hairs were soaked in absolute alcohol for twenty-

five minutes, then immersed in sterile salt solution and transplanted with sterile forceps to French proof agar in an Erlenmeyer flask, which was placed on the top of the incubator for twenty-four days. The resulting growth of fungus was triturated in a sterile mortar with chemically pure crystals of sodium chloride. To this enough sterile water was added to make normal saline solution. About 500 c.c. of vaccine was obtained from the growth of a single flask, and to this was added 8 to 10 c.c. of chloroform to kill the growth, and the vaccine then heated to 60° C. for one hour. To preserve the vaccine, 0.25 per cent phenol is mixed with it and the mixture put up in sterile tubes. From 1 to 2 c.c. is the usual dose, which may be given every three days hypodermically, the best site being the loose tissue between the scapulæ. The number of injections required varied from seven to seventeen, and the criterion of cure was the absence of fungus.

Mackee and Remer³ describe in great detail the method of administration of **X Rays**, by five exposures to a single scalp, which seems to be something of a novelty in the States, but has long been in operation in England. For details of technique the original paper should be consulted.

Ringworm of the scalp in adults is so rare a condition as to be noteworthy. Oliver¹ reports a well-established case in a woman, age 32, showing a small-spored ringworm of the scalp in herself and three of her children. Cultures on test media established the fungus as *Microsporon felineum*.

Another case in an adult is reported⁵ in an Egyptian native in whom the clinical appearances consisted in a matting together of the hair by yellow crusts, which when removed showed the skin to be red, swollen, soft, and pitting on pressure. The fungus present in the hair was identified by cultural experiments as *Trichophyton discoides*, an ecto-endothrix variety, with strong resemblance to favus, both in culture and in clinical effects.

REFERENCES.—¹*Amer. Jour. Med. Sci.* 1915, i, 96; ²*Jour. Cutan. Dis.* 1915, 181; ³*Med. Rec.* 1915, ii, 221; ⁴*Brit. Jour. Derm.* 1915, 119; ⁵*Ibid.* 243.

SALIVARY CALCULUS.

X-Ray diagnosis in (p. 54).

SALPINGITIS.

Bryden Glendining, M.S., F.R.C.S.

Goldstine¹ reviews the results of **Operative Treatment** in 328 cases, none of which were operated upon in the acute stage. Death resulted in 3 cases after operation; and 4 out of a total of 7 cases of tuberculous salpingitis were known to have died at the time of writing. The chief interest in the paper centres in those presenting themselves for further operation. Of these there were 44 cases, in which on account of the pelvic pain, menorrhagia, dysmenorrhœa, or leucorrhœa, a second operation was necessary. In all these, both tubes had been removed at the first operation, so

that the further trouble was to be found in the uterus or ovaries left behind ; in 24 one ovary and the uterus were left ; in 18 both ovaries and the uterus were left ; in 2 the uterus alone was left. At the second operation, in 40 cases the remaining ovarian tissue together with the uterus was removed, and in the remaining 4, resection of one ovary only was performed, and of these 2 returned for a third operation, when it was necessary to remove the second ovary. Thus it becomes evident that much discretion is required, in dealing with inflammatory conditions in the pelvis, as to that which may safely be left and that which requires removal. When the ovaries are damaged by lacerations in separating adhesions, or are involved by the inflammatory process, it is much safer to remove them. The author suggests that in this case the uterus should also be excised ; but we would suggest that in the absence of inflammatory changes in the uterus, auto-transplantation beneath the rectus of a part or a whole ovary would meet the case.

Taylor² thinks the frequency with which *tuberculous lesions* are recognized in the Fallopian tube, will vary with the thoroughness of the pathological examination. Thus, some authors give the frequency as 11·5 per cent of salpingitis, while other operators favour a lower figure of about 6 per cent. In considering the prognosis, it must be remembered that a good proportion of cases have lesions elsewhere, and further, if the salpingitis is but a symptomatic and painful manifestation of a more generalized tuberculous peritonitis, the outlook is much worse. When treatment is considered, it should be borne in mind that two factors, in many instances, tend to vitiate or interfere with any definite procedure : (1) Clinically the majority of cases are indistinguishable from ordinary diseased appendages ; and (2) even during operation, in about half the cases, it is not possible to recognize by the naked eye the tuberculous nature of the inflammation. However, having diagnosed the condition at the time of operation, no attempt should be made to save either tube, as the disease is almost invariably bilateral. As regards the treatment of the uterus, opinion is divided ; some authors leave the uterus and no further trouble is reported ; others, noting that extension to the uterus occurs in about half the cases, would always remove it.

REFERENCES.—¹*Surg. Gyn. and Obst.* 1915, ii, 239 ; ²*Jour. Amer. Med. Assoc.* 1915, ii, 950.

SANDFLY FEVER.

Sir Leonard Rogers, M.D., F.R.C.P.

W. O. Walker¹ has studied the influence of atmospheric temperature on sandfly fever on the north-west frontier of India. The incubation period, as shown by the time of occurrence of the disease among troops arriving at Chitral Fort, was found to be from three to five days. A sudden rise of atmospheric temperature was followed after a few days by an increase in the number of admissions, and a fall by a decrease, which he thinks due to the high temperature causing sandflies to abound and flourish.

C. Birt², in a discussion at the British Medical Association, gave a summary of our knowledge of three-day, sandfly, or phlebotomus fever, which is widely prevalent in the countries bordering on the Mediterranean and in the North West of India. The disease can be produced by injecting the blood into a susceptible subject during the first day of the fever, but the organism is probably ultra-microscopical. It is spread by the bites of sandflies, which breed in the crevices of damp walls. Graham³ deals with the disease in Chitral, where it was first described by McCarrison in 1906. It is met with up to a height of 6500 feet only, and troops kept at 7000 feet during the fever season entirely escape. One attack produces marked immunity. It is never a serious disease, leaving only weakness for some ten days. The pulse is slow, and slight leucopenia is found. Epistaxis was met with in 20 per cent of his cases. **Acetosalicyclic Acid** relieves the pains and headaches, and ensures sleep if given in the evening. J. W. Houston⁴ deals with the disease in Peshawur, where it begins suddenly in April and chiefly attacks regiments recently arrived from uninfected localities. He notes that a few sporadic cases of seven-day fever, similar to those seen in Calcutta and other Indian coast towns, also occur in the Punjab, and he is of the opinion that this fever is quite distinct from either three-day fever or dengue, and is probably carried by stegomyia. P. J. Marett⁵ gives an interesting account of the bionomics of phlebotomi in Malta, with the duration of the different stages in their life history.

C. J. Stocker⁶ writes on the bacteriology and **Vaccine Treatment** of sandfly fever seen in Rangoon, intermediate in type between sandfly, three-day fever, and dengue, with leucopenia. In 5 cases out of 35 he cultivated from the blood a bacillus identical in every particular with that described by Rogers as obtained by him in seven-day fever in Calcutta. A serum obtained by injecting a goat agglutinated the organism up to 1-800, and a sensitized vaccine was prepared and tried in 20 cases, in some of which the temperature came down by crisis or in steps over two days. Rabbits and monkeys were inoculated with the bacillus without success. Mosquitoes seemed to be the most likely carriers, and cultures were made from the stomachs of *Culex fatigans* fed on patients during the fever; in 18 out of 35 cases pure cultures were obtained from the stomachs of the fed insects, giving nearly all the reactions of Rogers's bacillus, but slightly more motile.

REFERENCES.—¹*Ind. Med. Gaz.* 1915, 50; ²*Brit. Med. Jour.* 1915, ii, 168; ³*Ibid.* 169; ⁴*Ibid.* 170; ⁵*Ibid.* 172; ⁶*Ibid.* 503.

SCALP, TUMOURS OF.

W. I. de C. Wheeler, F.R.C.S.I.

Corrigan,¹ of Cleveland, recommends an ingenious device to facilitate the bloodless removal of small tumours of the scalp and other localities under local anaesthesia. It consists of a semi-flexible ring made of soft lead or solder, which is pressed against the tissues surrounding the growth. By this means hæmostasis is perfect, and no

artery forceps need be used. The diffusion of the local anæsthetic is also prevented. The ring should be firmly pressed down by an

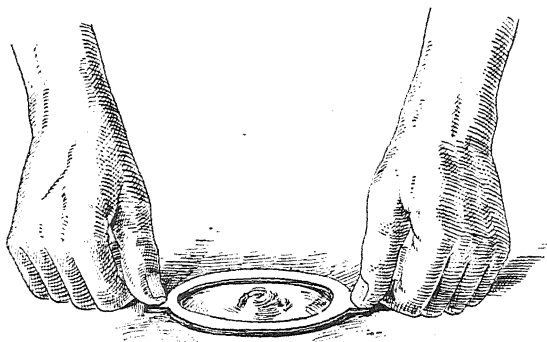


Fig. 47.—Compression ring for hæmostasis.

assistant after being roughly conformed to the surface surrounding the growth (see Fig. 47).

REFERENCE.—¹*Jour. Amer. Med. Assoc.* 1915, ii, 244.

SCARLET FEVER.

E. W. Goodall, M.D.

ETIOLOGY.—In a paper entitled "Experimental Scarlet Fever in the Monkey," W. Mair¹ gives an account of a number of experiments he has carried out with the view of ascertaining the cause of the disease. After pointing out that it is extremely difficult to be certain of the presence on a monkey of the rash of this disease, he draws attention to another phenomenon which he believes to be as constantly present as the rash, namely the appearance of certain changes in the staining reactions of the polymorphonuclear leucocytes. In blood-films taken during the acute stage of scarlet fever, stained by Leishman's method, a certain proportion of these leucocytes show blue patches of various shapes and sizes in their cytoplasm. These patches were first described by Döhle in 1912, and were thought by him to be parasitic inclusions. Subsequent investigation has shown this supposition to be wrong. Mair, by injecting, intraperitoneally and subcutaneously, blood and mouth-washings from cases of scarlet fever into monkeys of the genus *Macacus*, produced a rise of temperature and the appearance of Döhle's bodies.

Successful attempts were made to pass the infection on to other monkeys by means of cultures. In abscesses formed at the sites of injection of the cultures, numerous diplococci, closely resembling the pneumococcus, but without a capsule even in the tissues of the monkey or in the heart-blood of the mouse, were found. This diplococcus can be obtained from the throats of scarlet-fever patients. Injection of the diplococcus into monkeys gives rise to Döhle's bodies, whereas the injection of other micro-organisms does not. The diplococcus has so

far not been found in the blood ; it possesses certain cultural peculiarities. Mair suggests that this organism is the cause of scarlet fever, and that its action is much like that of the specific bacillus in the case of diphtheria, that is to say, it does not itself invade the system, but remains localized in the fauces, where it manufactures a toxin which is circulated in the blood. This toxin produces the fever and the Döhle's bodies. These latter are to be found only during the febrile period.

TREATMENT.—Donald MacIntyre² has tried the **Vaccine** treatment of scarlet fever at the Plaistow Hospital. One hundred cases admitted as scarlet fever during the first four months of 1913 were treated with doses of commercial stock vaccines of streptococci (50 million), and staphylococci (1000 million), repeated in seven days. The patients were all children under ten years of age. As a control, 100 similar cases admitted during the first four months of 1914 were taken for comparison. It was found that in the vaccine and non-vaccine cases respectively the following cases of complications occurred : Otorrhœa, 6 and 11 ; rhinorrhœa, 21 and 19 ; nephritis, 0 and 1 ; second attacks, 2 and 0 ; post-scarlatinal diphtheria, 3 and 4. The average period of detention in the vaccine cases was nine weeks, in the non-vaccine cases nine weeks and a half. From this it appears that the vaccine had no appreciable effect in the prevention of complications.

Five cases of septic scarlet fever were treated in the acute stage with autogenous streptococcic vaccine. The initial dose was 10 million, and it was doubled at intervals of ten days until the temperature dropped to the normal level. All recovered, but three developed otitis. It could not be said that the vaccine had a definite effect in any of the cases. The author also tried vaccines for nose and ear discharges. The vaccine consisted of cultures made on ordinary agar and incubated for twenty-four hours. "In most cases no attempt was made to isolate all the bacteria." The initial dose was 100 million, repeated and increased at intervals of five days until a maximum of 1600 million was reached. Of 28 cases of nasal discharge, 23 were cured, and 5 were not improved after eight doses ; while of 14 cases of otorrhœa, 8 recovered and 6 remained chronic. The author concludes that with regard to nasal discharge a cure is obtained more quickly with vaccine treatment than with ordinary methods. The same statement, however, cannot be made in the case of ear discharges.

REFERENCES.—¹Jour. Path. and Bact. 1915, xix, 444 ; ²Brit. Jour. Child. Dis. 1914, 472.

SCHISTOSOMIASIS.

Sir Leonard Rogers, M.D., F.R.C.P.

R. T. Leiper and E. L. Atkinson¹ visited China to investigate *Schistosoma japonicum*, especially regarding the carrier intermediate host of the parasite. After a long journey they obtained a dog with a very heavy infection passing mucus crowded with eggs which, after washing, were kept in clean water and rapidly hatched. They then sought for some molluscum which had an attraction for the embryos, and even-

tually found one they have named *Katayama nosophora*, which showed an extraordinary attraction for the miracidia, which attacked it in large numbers. In many specimens the liver of the infected molluscs contained tubes with bifid-tailed cercariæ with very short and slightly developed gut and a complete absence of pharynx, which was the type they were looking for. The livers of a number of these molluscs were teased in fresh water, allowing the miracidia to become free to swim about, and laboratory-bred mice were then immersed, no fluid being allowed near their mouths. The authors' work was stopped by the war, but the mice were taken with them, and in one which died on the voyage a single male schistosome was found, and in the last remaining mouse live male and female schistosomes were found in the portal vessels, thus completing an interesting piece of work.

REFERENCE.—¹*Brit. Med. Jour.* 1915, i, 201.

SCIATICA.

J. Ramsay Hunt, M.D.

Since the introduction by Lange of a method of **Perineural Infiltration** for the treatment of sciatica, a number of observers have reported favourably on the advantages of this procedure. Leszynsky¹ makes a further contribution to this subject based upon the results in 160 cases, in which 480 injections were given. Complications or unpleasant symptoms after the treatment were not encountered. The number of injections required varied from one to six. He believes that this method is a most useful one for the relief of pain, especially in chronic cases. It has also proved of benefit in acute cases.

The technique is as follows: During the application of the treatment the patient should lie on the abdomen with the legs fully extended, and the feet projecting beyond the edge of the table. A firm pillow is rolled and placed under the lower part of the abdomen in order to favour relaxation of the gluteal muscles. For the purpose of locating the nerve the following measurements are made: A line is drawn from the sacrococcygeal articulation to the postero-external border of the great trochanter: at the junction of the inner one-third and the outer two-thirds of this line is found the spine of the ischium. One inch to the outer side of this point we locate the point of puncture. An area of the skin about 4 cm. in diameter is then painted with iodine, the point of puncture being in the centre. The syringe used is all metal, holding 60 c.c. (2 oz.). It has a slip tip which allows the needle to fit the barrel directly. The needle is of steel, 12 cm. long, with a calibre of 2 mm., and provided with a sharp point, which is protected by a dull-tipped stylet projecting 1 mm. beyond. In puncturing the skin and subcutaneous tissue, the stylet is withdrawn beyond the cutting edge. It is then replaced, and the needle pushed in perpendicularly. When the sciatic nerve is reached, at a depth ranging from 6 to 12 cm., the patient may feel either a sharp pain radiating from the point of contact to the popliteal space or down to the foot, or a sharp pain in the corresponding heel; or there may occur a jerking movement of the leg, or

a sudden twitch in the calf muscles. Some patients complain only of diffuse pain in the buttock. The stylet is then removed. The syringe having been filled with sterile physiological saline solution at a temperature between 95° and 100° , the fluid is rapidly injected. The quantity used is from 80 to 120 c.c. The needle is then quickly withdrawn, the iodine washed off with alcohol, some collodion applied over the point of puncture, and this is covered with a small strip of sterile adhesive plaster. The patient is then instructed to lie in bed and rest for twelve to twenty-four hours. No anæsthetic is required. Strict aseptic precautions are absolutely essential. It should be borne in mind that the object is to produce infiltration of the nerve and the surrounding structures. It is not intended that the nerve sheath should be entered by the needle.

Strauss² records his experience in the treatment of sciatica by epidural injections of saline solution after the method of Cathelin. [This method would be particularly applicable to cases of chronic radiculitis in which the distribution of the pain and the sensory disturbances indicate involvement of the roots rather than the trunk of the sciatic nerve.—J. R. H.] The epidural space in an adult begins at the lower edge of the first sacral vertebra, where the dura ends. It extends down to the sacrococcygeal articulation. At this level the injections are made. There are certain landmarks by which this opening, the foramen sacrale superius, may be identified. It lies at the end of the crest made by the spines of the sacrum. It has the shape of an inverted V or U, and is about 1 cm. wide and from $1\frac{1}{2}$ to 2 cm. in length. It is bordered laterally by two prominences, the *cristæ sacrales laterales*, which are usually easily felt by the finger. The opening is covered by a dense fibrous ligament, the *ligamentum sacrococcygeum*. The opening lies generally 2 cm. above the end of the gluteal fold.

TECHNIQUE.—The needle which is used for the injection should be about 8 cm. in length and about 1 mm. in calibre. It must be firm, or else it is apt to be broken when forced through the ligament. It is to be inserted to a depth of 6 cm. to reach the second sacral vertebra. If possible, place the patient in the knee-chest position in order more easily to locate the landmarks. If this cannot be done because of pain, insert the needle while the patient lies on the side with the knees and the thighs flexed. In the latter position the landmarks are not so easily discerned, and the gluteal fold usually points above the foramen. It may be difficult, if not impossible, to enter the epidural space of very stout persons, especially of stout women. Strauss anæsthetizes with novocain the skin and tissue overlying the foramen and the ligament. In doing this one must be careful not to cause much swelling, which might obliterate the landmarks. After pushing the needle through the skin, considerable resistance is met at the ligament. Once this resistance is overcome, the needle glides into the epidural space. If the patient is in the knee-chest posture, the needle is inserted into the ligament at an angle

of twenty degrees with the body. After it has passed through the ligament the needle is held so that it is horizontal to the body. Before injecting, it is well to be certain that neither veins nor dura have been pierced. If only saline solution be used, no harm would result if these structures be pierced. The injection consists of warm sterile physiological saline solution. To the first 10 or 20 c.c. of saline is added 0.3 c.c. of novocain with suprarenin, and a few minutes are allowed to elapse after their injection to obtain the full benefit of their anæsthetic effect. In all, 60 to 80 c.c. of solution are injected at a time. This is a larger quantity than has been used by others, but Strauss find it acts well and does no harm. He has injected as much as 130 c.c., but such an amount is unnecessary. Occasionally, when large amounts are injected, a swelling develops along the outer border of the sacrum, which is apparently due to the fluid escaping along the nerves through the intervertebral foramina.

Zapffe³ describes a severe and intractable sciatica which was relieved by the administration of an **Autogenous Vaccine**, prepared from organisms (staphylococci and a diphtheroid bacillus) isolated from the urine. The patient was thirty-two years of age, and the symptoms of sciatica made their appearance six weeks after a gonococcus infection. The pain was very severe and typical in distribution. A most careful clinical and laboratory examination failed to reveal an exciting cause. It was unrelieved after eight months of treatment which included alcohol injection of the spinal nerve roots, immobilization in a plaster-of-Paris cast, and Buck's extension. Paquelin cautery and gonococcus vaccine had also been given without success. A mixed vaccine was prepared from the organisms isolated from the urine, and seven injections in all were given. The pain ceased after the fourth injection, and has not recurred during the subsequent eight months. Emphasis is placed on the importance of using autogenous and not stock vaccines.

REFERENCES.—¹*Med. Rec.* 1915, i, 211; ²*Ibid.* 213; ³*Jour. Amer. Med. Assoc.* 1915, i, 238.

SCLEREMA NEONATORUM.

E. Graham Little, M.D., F.R.C.P.

There is a well-recognized but rare condition characterized by a progressive induration of the skin and adjacent tissues, occurring in infants either at or shortly after birth, and frequently associated with subnormal temperature, slow pulse, and general excessive debility; the child usually dies within a few days of the appearance of these symptoms. The condition has been described under a great multiplicity of names, and it is probable that at least two affections, closely allied but with separable characteristics, have been recorded under these names. It is preferable to resolve the confusion by adopting the two classes of (1) *sclerema neonatorum* and (2) *adema neonatorum*, with the possible addition of a third, 'pseudosclerema.'

Paterson¹ gives a most useful and admirable résumé of the subject, and adds the record of two new cases. In his opinion cases classed

as œdema neonatorum are of various types, and this group does not constitute a specific disease as does scleroma, but is rather a symptom, like œdema in the adult, of constitutional disease. The clinical differentiation from sclerema lies especially in the presence of serosity in the skin, which pits, whereas in true sclerema pitting is never obtained, and the parts affected are those in which tissue is lax, as in the labia and scrotum, and eyelids, where sclerema is absent. It is, however, possible that œdema may be a secondary symptom in true sclerema. Pseudosclerema seems to cover simply those cases of sclerema which are milder and non-fatal, and there is no true ground for the retention of this group or title.

The clinical characteristics of sclerema have been excellently described by Parrot and Denis, from whom Paterson quotes thus: The skin becomes stretched and the surface is remarkably smooth. It loses flexibility and mobility over the subjacent parts. The alteration begins in the lower limbs; the lumbar region is then invaded, next the lower part of the trunk, and finally the whole body, the face included. Daily one may see the tension and hardness of the skin make progress, and soon, on touching it, one has the feeling which thick leather gives. The integument is not to be pitted by pressure of the finger, and its colour becomes faintly bluish or livid. The indurated parts of the body are neither elastic nor doughy: from the effects of the disease they have acquired the firmness of suet. The movements of the limbs naturally become impeded by the changes in the skin.

Of the conditions found after death, Paterson considers that septicæmia would afford a rational explanation. The microscopic findings of subcutaneous fibrosis, destruction of the fat, and increased leucocytosis, are all suggestive of toxic irritation. This explanation is further supported by other post-mortem findings which are frequent though not constant, and include bronchitis, bronchopneumonia, hæmorrhages into the serous cavities, and polyarthritis.

TREATMENT.—Maintenance of the body heat is the most essential measure, and may be conveniently secured by an **Incubator**. **Massage**, with lubrication of the surface with **Iodex**, was practised with success by the author. Cardiac weakness is another symptom which must be met, and **Whisky**, **Digalen**, and **Adrenalin Chloride** (1-1000) were used for this end. Extract of **Thymus Gland**, 1 to 2 grains twice daily, seemed to modify favourably an individual case. Bacteriological investigation is much needed, and the most promising antidote in view of the probable septicæmic causation would be an autogenous **Vaccine**.

REFERENCE.—¹*Quart. Jour. Med.* 1915, July, 317.

SCLERODERMIADACTYLIA.

E. Graham Little, M.D., F.R.C.P.

Parkes Weber¹ reports two cases of this affection, in both instances in Hebrews. In the first, a man, age 48, the toes were affected, the skin over these being atrophic and shiny, and discoloured by purple mottling. Pulsation could not be felt in the feet, but was present in

the femoral arteries. There was dry gangrene of some of the toes, and ulceration had occurred at both heels. Marked anæmia, with a polymorphonuclear leucocytosis, developed later. The second patient, a woman, age 44, showed, besides the sclerodactylia of the fingers, a widely-spread scleroderma involving face, neck, and hands, and an early stage of the disease on the dorsum of the feet. Ulcers frequently developed on the areas affected with sclerodactylia, and there was an indolent ulcer on one heel. Pulsation was absent in the feet, but apparently normal in the radials. Skiagrams showed decided atrophy of the bones of the face and fingers. **Syrup of Iodide of Iron, Thyroid, Aspirin** to relieve the pain of ischæmic ulcers, and injections of **Fibrolysin** were tried with apparently small success.

REFERENCE.—¹*Brit. Jour. Derm.* 1915, 113.

SCOLIOSIS. (*Vol.* 1915, *p.* 528.)

SEMINAL VESICULITIS. *J. W. Thomson Walker, M.B., F.R.C.S.*

Thomas and Pancoast¹ contribute an article on the pathology, diagnosis, and treatment of *seminal vesiculitis*. Chronic seminal vesiculitis, they hold, is a far more prevalent disease than the average physician realizes. The symptoms vary greatly, and may affect parts remote from the urinary tract. In some instances it may be the cause of acute and chronic synovitis and urethritis, articular and muscular rheumatism, rheumatoid arthritis, arthritis deformans, gout, hypertrophic arthritis, chronic bladder disturbances, recurrent epididymitis, impotence, renal and cardiac complications, digestive disturbances, and a great collection of mental and nervous symptoms.

The authors liken the disease to 'pus tubes' in the female subject. Treatment depends on the condition of the vessels, ejaculatory ducts, and vas deferens, as determined by palpation, massage, and microscopical examination of the expressed fluid, supplemented, when necessary, by vasopuncture and collargol radiography.

Experienced **Massage** will suffice, in the majority of patients, to effect a cure. In many, however, massage having failed, convalescence may be accelerated by **Vasopuncture, Vasostomy**, and direct **Medication** of the seminal vesicles. In certain cases seminal vesiculotomy or vesiculectomy should be performed.

Bilateral vasopuncture and **Collargol** injection have resulted in at least temporary cure of a number of cases of persistent chronic seminal vesiculitis. Collargol radiograms in normal and pathological cases have demonstrated an ejaculatory duct sphincter, the intimate relation between the ureter and the seminal vesicle, the presence of stricture or obstruction of the vas, congenital anomalies of the seminal vesicles, and inflammatory enlargements of the vesicles.

Bentley Squier² gives his experience of the results of drainage of the seminal vesicles in 50 consecutive cases. The patients that are benefited by this operation are comprised in three groups: (1) Those with a gonorrhœal history, and a continuous or intermittent urethral

discharge, and pyuria; (2) Those in whom perineal pain or rectal symptoms predominate; (3) Those with a gonorrhœal history who suffer from arthritic symptoms or other systemic manifestations of chronic infection. A very important factor in the pathology of chronic vesiculitis is the additional element of mixed infection. With the exception of acute suppuration cases, the gonococcus is absent. Squier suggests that the gonococcus may undergo a process of mutation.

The operation suggested is similar to that for exposure of the prostate in perineal prostatectomy. The blunt dissection is carried beyond the base of the prostate, and two stout traction sutures are introduced through the base of the prostate. By pulling on these the prostate is rotated and the bladder base exposed. The fascia covering the vesicles is incised and the vesicles are widely separated. They are freely opened, and a rubber catheter tube is sutured in as a drain. The perivesicular space is drained by a gauze wick.

Drainage of the vesicles for chronic infection in this series of 50 cases produced a cure in 68 per cent of all cases operated on, improvement in 24 per cent, and no improvement in 8 per cent. The largest percentage of cure was in cases where arthritic symptoms predominated, namely 76.6 per cent cured and 23.6 per cent improved. The group which showed pain was the next most successful. Cure resulted in 66.6 per cent, improvement in 25 per cent, and no improvement in 8.4 per cent. The least satisfactory was the pus group, where cure resulted in 61.9 per cent, while 23.8 per cent were improved, and 14.3 per cent were unimproved. Twenty-five per cent of the pain group were complicated by calculi of the vesicle. When neurasthenic symptoms were associated with the other symptoms, they were completely cured. Approximately 10 per cent of the patients suffered from post-operative impotence. This was transient in all but one case, sexual capacity being regained in from four to six months.

REFERENCES.—¹*Ann. Surg.* 1914, ii, 313; ²*N. Y. Med. Jour.* 1915, i, 333.

SHELL SHOCK.

J. Ramsay Hunt, M.D.

An unusual and striking effect of the present war is the large number of cases showing the results of exhaustion and shock to the nervous system. Particular interest attaches to that group of cases which has come to be known as shell shock, a condition closely allied in nature to the traumatic neuroses of civil practice; the prognosis, however, appears to be more favourable, probably because of the fundamental health of the individuals affected and the unprecedented nature of the exhaustion and terrific shocks entailed by modern trench life, and warfare with high explosives; so that in the majority of cases, after a short period of rest and treatment, the symptoms of shock disappear. Aldren Turner¹ has made an instructive study of these cases as they were admitted to the various base hospitals in France. They may be divided into two great groups:

(1) Shock from shell explosion in the immediate vicinity ; (2) Extreme neurasthenic states from stress and fatigue.

1. This group may be subdivided into (a) A cerebral type, characterized by stupor or amnesia, which have the characteristics of the hysterical or hypnoidal states of civil practice. The pupillary reflexes may, however, show impairment. (b) A spinal type, characterized by paralysis of the legs, preservation of the reflexes, and anaesthesia of the hysterical type. The arms are rarely involved, and in the earlier stage there may be retention of urine. (c) A type with involvement of the special senses, causing blindness, deafness, and deaf-mutism ; these cases bearing the earmarks of hysterical or psychogenic origin. In some of the cases, however, perforation of the drum membrane, or superficial injury of the conjunctiva by fragments from the explosion, was present. Some of the special effects noted were stammering speech, localized palsies, and blepharospasm. In nearly all these cases there was a previous history of prolonged and exhaustive nervous strain followed by the bursting of a shell in close proximity.

2. The neurasthenic group corresponds very closely to the same condition as observed in civil life. There is, however, a more acute form which is best indicated as *temporary nervous breakdown*. The more severe cases were very near the border-line of the exhaustion psychoses.

Fiessinger² has also observed the emotional shock from the bursting of big shell, and emphasizes the tendency of these cases to develop a day or two after the event ; he mentions also the conspicuous absence of emotional shock effects in those who are severely wounded.

T. R. Elliott,³ in a discussion of transient paraplegia from shell explosions, admits the frequency of functional cases, but insists on the occasional presence of signs of organic damage, viz., depression of all the reflexes and lowering of the tone of the muscles, a band of hyperalgesia at the upper level of the area of numbness, and a localized area of tenderness of the spine. Myers⁴ has also recorded interesting examples of shell shock with amnesia, visual disturbance, and loss of the sense of smell and taste.

Grasset⁵ and Roussy⁶ have contributed to the psychoneuroses of war, and point out the great frequency and economic importance of this group of cases. Special emphasis is laid on the psychic treatment and the avoidance of psychic contagion in the large hospitals where such cases are congregated. Ravaut⁷ insists on the existence of a material lesion of the central nervous system in many of these cases presenting a clinical picture of hysteria. He has been able to demonstrate, in the cerebrospinal fluid of such patients, blood and an excess of globulin, where there has been no external evidence of trauma. This excess of globulin may be only transitory, and its disappearance coincide with the amelioration of the symptoms. He even advocates lumbar puncture as a therapeutic procedure in such cases.

Such conditions often result from the mere force or aerial concussion of high explosives, and M. Arnoux, a French engineer, has computed

the probable dynamic pressure exerted by the surrounding air on bodies within a few yards of the exploding shell, as ten thousand kilos to the square metre. This would produce an alteration in the tissues analogous to that observed in aeronauts and caisson-workers: the rapid formation of air-bubbles in the blood and tissues, with hæmorrhage. This phase of the question has been recently discussed by W. F. Stevenson.⁸

REFERENCES.—¹*Brit. Med. Jour.* 1915, i, 833; ²*Med. Press and Circ.* 1915, i, 563; ³*Brit. Med. Jour.* 1914, ii, 1005; ⁴*Lancet*, 1915, i, 316; ⁵*Presse Méd.* 1915, 105; ⁶*Ibid.* 115; ⁷*Ibid.* 313; ⁸*Brit. Med. Jour.* 1915, ii, 450.

SHOCK, SURGICAL. (Vol. 1915, p. 534.)

SKIN DISEASES, GENERAL THERAPEUTICS OF.

E. Graham Little, M.D., F.R.C.P.

Douglass Montgomery¹ points out that the addition of **Boric Acid** to water makes a solution with something of the tonicity of physiological salt solution, and thus constitutes a useful preliminary to further treatment when moist dressings or compresses are wanted. Thus towels wrung out in a hot 3 per cent solution are a valuable compress which should be worn for about fifteen minutes as a preliminary to the application of ointments such as sulphur or resorcin, in *acne*, or in *superficial pus infections* of the skin. For *furuncles* a 4 per cent solution may be used as fomentation, or the boric starch poultice may be preferred. For *styes* and for the follicular pus infections of the entrance to the nares, pledgets of cotton-wool soaked in saturated boric lotion as hot as can be borne should be kept on the parts for half an hour twice a day, and after this an ointment of 1 per cent mercuric oxide in vaseline is recommended in the case of the eye, and 12 per cent calomel or xeroform ointment for the nose. For the removal of the crusts of *impetigo contagiosa* and preliminary treatment of *varicose ulcers*, boric starch poultices are excellent, for the preparation of which the following directions are given:—

“Take ordinary common lump laundry starch, and pulverize it. This pulverization is to be done before the measuring. Dissolve one slightly heaping tablespoonful of the pulverized starch in two tablespoonfuls of cold water. Add to this one coffee-cupful of boiling water, stirring rapidly until the mixture is a thick paste. To this paste add a tablespoonful of boric acid, free from lumps, and stir well until thoroughly mixed. Fold the warm jelly between layers of thin muslin or cheese-cloth, and apply as hot as can be borne.” For widespread surface infections, a lotion of saturated boric acid in dilute alcohol is even better than the watery solution.

An excellent abortive dressing for *paronychia* in its early inflammatory stages is the following:—

R	Liq. Alumini Acet.	℥j	Acid. Boric. sat. sol. in aq.	
			dest.	℥x

The finger should be soaked in this, and gauze wet with the solution may be wrapped round the finger, covered with a rubber stall, and worn for several hours. A powder of equal parts of boric acid and talc, or of boric acid, zinc oxide, and starch is an admirable drying agent in many discharging conditions. [Boric ointment as usually prescribed is too weak an antiseptic. The strength used by Lister, 16 per cent, is preferable to the commoner 8 per cent ointment.—E. G. L.]

Chrysarobin.—Schamberg, Kolmer, and Raiziss² investigated the germicidal properties of chrysarobin, in an endeavour, by explaining its action in ameliorating *psoriasis*, to explain the difficult problem of the causation of that disease. Another nearly insoluble powder, calomel, was chosen as a control in experiments on the respective inhibiting powers upon growing bacteria. It was found that chrysarobin was practically without germicidal action, while calomel was strongly inhibitory of bacterial growth. Chrysarobin, which has often proved efficacious in the treatment of ringworm, was tested for its inhibitory power on ringworm cultures, and found to be completely inactive in arresting its growth. By a further ingenious experiment it was demonstrated that chrysarobin exerts no germicidal effect in the living tissues.

Sodium chrysophanate, a salt which it is probable is formed when chrysarobin comes in contact with the fluids of the tissues, possesses a very weak germicidal power *in vitro*, which does not seem to be maintained *in vivo*. Experiments were in like manner conducted on the inhibitory effect of chrysarobin and sodium chrysophanate on the development of trypanosomes, the species used in the tests being the *T. lewisi*. Here, too, no effect was produced.

Arsenious Acid and **Sodium Arsenate** exerted practically no inhibitory effect on bacterial growth, tested *in vitro* and *in vivo*. The same reagents tested with trypanosomes showed a weak parasiticide action, but only in doses nearly equal to lethal doses.

Pyrogallol similarly tested showed feeble parasiticide power against bacteria *in vitro*, which was not sustained *in vivo*; it had no effect on trypanosomes.

The conclusions to be drawn from these data point to a non-bacterial causation for *psoriasis*, in that three of the most efficient drugs in its treatment are practically non-germicidal.

Trimble and Rothwell³ conducted a series of experiments with auto-serum therapy and a weak chrysarobin ointment in thirty cases of *psoriasis*, and condemn the addition of serum as entirely useless. They seem to have been surprised at the efficiency of weak chrysarobin ointment (2 per cent) in comparison with strong (10 per cent), and at least one beneficial result of their paper should be the substitution of weaker for stronger applications of chrysarobin, which is commonly used in far too powerful proportions.

Serum Therapy.—Willock,⁴ with an experience of ten cases, denies that serum therapy is of any benefit in the treatment of *psoriasis*.

Indeed, he found that cases treated with chrysarobin alone did better than those in which serum was used in combination with chrysarobin. Disappointing results were also recorded in the treatment of eczema by this method. In three cases of dermatitis herpetiformis there was at first rapid improvement, but this was not sustained.

Howard Fox⁵ is more dubious than formerly of the value of serum therapy in psoriasis, but remains impressed with its importance as an adjuvant in the treatment of dermatitis herpetiformis. He has come to prefer the method of intramuscular injection to intravenous.

A report of the result of injections of autogenous serum in several forms of skin disease is furnished by Hilario,⁶ who describes improvement in a very obstinate case of *hydroa aestivalis*, in which, after five injections of 15 c.c. each, the patient made an excellent recovery. In *psoriasis* his conclusions support those of Spiethoff and Fox, to the effect that the serum appears to modify favourably the reaction of the skin to reducing agents, but does not act alone. In *lichen planus*, of which, however, only one instance was observed, and in *dermatitis herpetiformis*, the method was most satisfactory. The dose varied from 15 to 35 c.c., and the number from five to eight, usually at weekly intervals. The technique of preparation is very similar to that described by Fox. The product should be clear light greenish-yellow, free from flocculent or shreddy precipitates, and when injected into the body should not increase temperature.

Swann⁷ reports beneficial effects in a case of *urticaria* associated with *purpura* treated with an exogenous serum derived from the brother of the patient. Six injections were given, the total amount being 100 c.c., with intervals of one week to twenty-five days between the injections. Concurrently with the clinical improvement, the coagulation-time, which had been very protracted, became normal.

Calcium Lactate.—White,⁸ instigated by Wright's views on coagulability, has experimented with this drug in a number of skin diseases, and describes good results more especially in *chilblains*, *hyperidrosis*, *herpes simplex*, *erythema multiforme*, *urticaria*, *livedo*, *purpura*, and *angioneurotic œdema*. At the same time patients were enjoined to partake of foods rich in calcium, and to avoid all acids in the diet, fruit being one of the most usual vehicles for acid. The items of diet from which the patients were invited to make their selection were as follows, with the respective calcium content indicated:—

GRAMS OF CALCIUM OXIDE IN EACH KILOGRAM.

Meat	..	..	0.06	Peas	..	..	1.20
Potato	..	..	0.20	Beans	..	..	1.45
White bread	..	..	0.30	Cow's Milk	..	..	1.51
Rice	..	..	0.78	Yolk of Eggs	..	..	1.90
Dates	..	..	0.80	Spinach	..	..	1.96
Cocoa	..	..	1.15	Butter	..	..	3.50

The mixture which was used throughout was of the following composition :—

R	Calc. Lactat.	gr. viij	Aq. Chlorof.	ʒj
	Tinct. Capsici	℥ss		

With this, local treatment was always combined, usually consisting in the application of a lotion of zinc oxide, carbolic acid, and lime-water, the proportions of which are not specified.

Carbolic Acid and Alcohol.—Judd⁹ records eleven years' experience of a method of treatment for *erysipelas* by carbolic acid and alcohol, which has given such good results that throughout that period he has used no other. The technique "consists of painting carefully with a swab of cotton upon an applicator, the entire surface of the involved area, and extending about half an inch into the surrounding apparently healthy skin, with 95 per cent carbolic acid. This is left until the purplish colour of the inflamed area is replaced by a pretty complete whitening of the skin. It is essential to the success of the procedure that we await this whitening before we proceed to the next step. On the other hand, if we allow the whitening to proceed to a thorough blanching, we produce a distention of the epithelium, a slough of the skin, which, while it will not produce a scar, will prove painful to our patient, delay our result, and add nothing to the efficacy. Where large areas are involved, it is advisable that only a portion be painted at one time. The second step consists in going over the whitened area very thoroughly with a second swab saturated with alcohol. If this swabbing is done thoroughly, the whitened area becomes once more pink, and the alcohol must be laid on until this is accomplished. After this we proceed with other areas with carbolic, neutralizing with alcohol, until our operation is complete at one sitting. It is essential to include half an inch of apparently sound skin, as the bacteria of *erysipelas* are found beyond the apparently involved area. In some of our first cases we neglected this precaution, and found in twenty-four hours that, while we had completely controlled the initially inflamed area, a ring of newly inflamed tissue extended out in all directions beyond, much as an advancing ringworm extends. Our method includes the painting of the hairy scalp, the eyelids, the mucous membrane of the alæ of the nose, and the nipple of the breast, if necessary. We have failed to note any evil result. There has been no toxic action of the carbolic in any case so far observed, although the urine is sometimes darkened and of characteristic odour. The temperature falls rapidly, and, in severe cases, it is frequently necessary to support the patient with strychnine and whisky." One application is usually sufficient to control the inflammation. The subsequent management consists in the use of moist dressings, simple saline or 1-20,000 bichloride. This method may be used in conjunction with the administration of autogenous vaccines. Similar procedure may be adopted for *boils* and *carbuncle*.

Vaccines.—The external use of vaccines in skin diseases has been practised by Towle¹⁰ since 1912, and he now presents a paper on his experience in over 150 cases treated. The best results were obtained in the case of staphylococcic diseases, and especially furunculosis. A typical prescription is as follows :—

R	Stock Staphylococcic Vaccine	400 million	Liquid Cold Cream (an emulsion of fat)	10 parts
	Boric Acid	2 parts	Cold Cream	20 parts

The amount of vaccine indicated is rubbed up with a simple ointment base modified according to the degrees of exudation present, and the application is made by friction when the surface is dry, and by simple apposition when exudation is free. Very remarkable results are recorded with the treatment in chronic pus infections such as *sycosis*.

Combined acne and staphylococcic vaccines were used in seborrhœic conditions such as *acne* and *seborrhœic alopecia*. A fluid ointment containing 400 million staphylococcic vaccine and 100 million acne in 100 c.c., which was employed, at first twice and afterwards once a week, was most successful in some chronic seborrhœic diseases. The applications may be made more frequently over a short space of time, as often in fact as once daily. Ointment made with tuberculin (T.O.), one milligram to the ounce of base, rubbed into the affected tissue night and morning, was very successful in two cases of *chronic lupus*. If suppuration is prominent as well, the addition of 400 million stock staphylococcic vaccine hastens the improvement. In four cases of *lupus erythematosus* the same strength of tuberculin ointment was used, with the addition of 200 million stock acne vaccine, with excellent result in three out of the four cases.

In a very extensive case of *sycosis* due to trichophyton an ointment containing 800 million staphylococcic vaccine, and 30 gr. of boric acid to the ounce of base, was massaged into the affected skin twice a day, and spread on a dressing kept in position with bandaging. Immense improvement was noted within twenty-four hours.

Chlorides.—Following a full review of the present views on the part taken in metabolism by the chlorides, Ravitch and Steinberg¹¹ consider in more detail the effect on certain skin diseases. In *prurigo* there is some reason to suppose that the excretion of chloride is usually increased, but that periods of retention and elimination alternate. There seems to be some relation between the output of chlorides and the secretion of internal glands, as feeding with thyroid is noted to cause a rise of excretion of chlorides, followed by a compensatory retention. In *Graves's disease* considerable excretion of chlorides takes place in the sweat. In some forms of *acne* it seems probable that a cause may be found in the excretion of chlorides in the sebaceous glands, and chlorides have been found in the contents of the acne pustule. Mineral metabolism plays a very important part in the etiology of *eczema*. In a small series of experiments the

authors claim to have found that eczematous conditions improved with the addition of sodium chloride and became worse with its removal. The results in twenty-three such experiments are tabulated in this paper, and go to show that the administration of sodium and calcium chloride acted beneficially in a series of twelve cases as compared with eleven similar cases in which a salt-free diet and medication were used. The experiments lasted from five to twelve weeks. No details of exact doses are supplied.

Ointments.—Galloway¹² attempts with much success to place on a rational basis the application of ointments in skin therapy. He recognizes three classes of base, the first being the animal fats, of which lard is the type, and the vegetable oils which form the basis of the cold creams. The second group includes the mineral oils, the paraffins derived from petroleum. These have the advantage over the animal fats that they do not decompose, and are more easily prepared to any desired consistence. They are not so readily absorbed by the skin. The third group includes glycerins, gums, and starches, which are often used in combination with the other two groups. The purpose of an ointment may be protective and emollient, or as a vehicle for administration of medication. The application of a strong mercurial ointment such as ung. hydrarg. may actually aggravate and spread an infection by injuring the neighbouring skin, which in this way becomes more vulnerable to the infection, which the anti-septic power of the ointment is insufficient to kill. Useful hints are given to prevent this by localizing the action of the ointment by protecting the contiguous skin with a powder, or by increasing the adhesiveness of the ointment by powdering the surface with a combination such as the following: Cimolite, 60 parts; zinc oxide, 20 parts; boric acid, 20 parts. Often it is better to avoid the use of strong mercurial ointment, and full strengths of ung. boracis are preferable.

A well-known method of application is described, in which the ointment is spread on lint, and covered with a thin layer of gauze, which intervenes between the bulk of the dressing and the skin. A warning is given against the use of strong ointments containing chrysarobin in psoriasis; and when there is much congestion chrysarobin is better avoided altogether.

Ointments may be used as simple emollients, of which there are two main groups, those containing the simple fats or oils, and the glycerinated preparations, which may be better tolerated than greases. Here is a prescription of an ointment which has its uses in keeping the skin smooth and supple:—

R	Adipis Lanæ Hydrosi	℥j	Otto Rosæ	℥j
	Paraffini Liq.	℥ij	Aquæ Rosæ	℥iv
	Vanillin.	gr. ¼		

Another satisfactory prescription is as follows:—

R	Soft Paraffin	8 parts	Boric Acid	6 parts
	Anhyd. Lanoline	3 „	Water	6 „
	With perfume as required.			

As examples of glycerinated 'skin foods' the two following formulæ may be recommended:—

1. R	Tragacanthæ	gr. vj	Liq. Hamamelidis	℥xlviij
	Glycerini	℥ij	Tinct. Benzoini	℥ij
	Spt. Vini Rect.	℥j	Aquæ	℥ss
2. R	'Muguet' ('Lily of Valley' perfume)	℥j	Lanolini	
	Zinci Oxidi	gr. lx	Vaselini	āā gr. cv
			Glycerini Amyli	gr. cex
			Dispense in a collapsible tube.	

The employment of **Ultra-violet Rays** discussed (*p.* 67).

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1915, i, 883; ²*Jour. Cutan. Dis.* 1915, 1; ³*Ibid.* 621; ⁴*Jour. Amer. Med. Assoc.* 1915, ii, 14; ⁵*Jour. Cutan. Dis.* 1915, 616; ⁶*Ibid.* 1914, 780; ⁷*Jour. Amer. Med. Assoc.* 1915, i, 737; ⁸*Jour. Cutan. Dis.* 1914, 691; ⁹*N.Y. Med. Jour.* 1915, i, 1208; ¹⁰*Jour. Cutan. Dis.* 1914, 770; ¹¹*Ibid.* 1915, 466; ¹²*Pract.* 1914, ii, 735.

SKIN, NEUROTIC EXCORIATIONS OF.

E. Graham Little, M.D., F.R.C.P.

Three types of disease, Adamson¹ says, may be included under this general heading: (1) *Dermatitis ficta*: excoriations usually caused by the friction of a wet finger produced by hysterical women and malingerers; (2) *Acne urticata* of Kaposi; (3) *Acné excoriée des jeunes filles* of Brocq.

The first group is well recognized and fairly common. Whether it is the result of a true neurosis, or of an attempt to deceive or to acquire a notoriety, is not always easy to decide.

In the second group the symptoms commence as a circumscribed, intensely itchy lesion in neurotic subjects. It is a moot point to determine the sequence of events, i.e., whether there is really any definite lesion prior to the scratching, or whether the papule which ultimately develops is not the sequel of the scratching. Be this as it may, there seems little doubt that the deep excoriations which are the striking clinical feature are to be ascribed to the fact that the patient herself digs out with her finger nail the whole itchy minute section of skin, relief being apparently obtained only when free bleeding has taken place. Peculiar and highly characteristic scarring in brown streaks is left by this procedure, and has been probably mistaken, especially by Continental authors, for the result of necrosis, the term *acne necrotisans* being synonymous with this group. The lesions usually appear at first on the face, but may spread later to the trunk and limbs. They have no relation to *acne vulgaris*.

The third group covers a class of cases occurring mostly in young girls, the subject of *acne vulgaris*. The excoriation is often started by the patient's violent desire to rid herself of a detested disfigurement, and the feeling may be initiated by too sedulous a sympathy expressed by relatives or friends. In this form the erosions are usually small, and limited to the face.

TREATMENT.—This is a difficult problem. At a recent debate at the Dermatological Section of the Royal Society of Medicine, divergent

opinions were expressed as to the advisability, in the first class of cases, of revealing to the patient the fact that the physician knows of the artificial production of the symptoms. It is certainly unwise to tax a patient with the act unless proof is forthcoming, and usually this is exceedingly difficult to produce. When there is, as is often the case, an epileptic strain in the patient's history, it is quite possible that the act is involuntary and unconscious. In all forms of this type of disease, measures should be taken to prevent the self-infliction of injury, as by covering the parts attacked in such a manner that the patient is unable to gain access to them. There is often some obscure, semiconscious stimulus, such as pruritus, or a partly forgotten hurt, which may apparently start the train of feeling that comes to be centred about the part. Antipruritic applications, occupation to withdraw attention from self, cultivation of self-control, and removal from a too sympathetic environment, are adjuvant measures. Suggestion may be a powerful aid in controlling the semi-conscious feeling which is at the bottom of the manifestation.

REFERENCE.—¹*Brit. Jour. Derm.* 1915, 11.

SKIN, NEW GROWTHS OF. *E. Graham Little, M.D., F.R.C.P.*

Sweat Glands.—Alderton and Turnbull¹ report two very remarkable cases of tumour of sweat glands. In the first case a man, age 67, noted a swelling on the site of a congenital mole behind the right ear. He was seen a year after the appearance of the swelling, which was then a brown, lobulated, irregular, triangular tumour occupying the interval between the zygoma and the angle of the jaw. The swelling was hard, exuded pus, and was painful. It was excised, and the raw area treated with three doses of $\frac{3}{8}$ pastille exposure of **X Rays**, under which it healed well. Histological examination of the excised mass showed an inflamed papilloma, with part of the interpapillary tissue formed of a dilated and greatly elongated sweat-duct, with dense cellular infiltration surrounding it. The second case was in a man, age 32, in whom eighteen months previously a flat, brown, wart-like growth had made its appearance on the anterior aspect of the right wrist. This sustained injury sixteen months later, became swollen and painful, and was at first thought to be a tuberculous granuloma, and treated with creosote and salicylic plaster and four pastille doses of *x* rays. No permanent improvement resulting, when the tumour had grown to the size of a shilling, with an ulcerated surface, it was excised. Glandular metastases speedily showed themselves, and the patient died. Histological examination revealed a melanotic carcinoma originating probably in sweat-duct epithelium.

Multiple Inclusion Cysts of the Epidermis.—Graham Little² reports what seems to be a unique case of this condition. The patient, age 67, had noted the efflorescence of a number of small pearly-white swellings, with some resemblance to boiled sago grains in aspect and size. They had become progressively more numerous since their first appearance three years previously, and when she came under

observation there was an aggregate of some hundreds of tumours, distributed chiefly on the neck, axillæ, the flexor surface of both upper arms, the hypogastrium and pubic region, the popliteal spaces, the front of the legs, the back of the elbows, and the forehead. The distribution was remarkably symmetrical. The tumours, which were strikingly homogeneous in size and appearance, showed in some instances a patulous opening through which cheesy matter could be readily expelled by pressure; in other instances the surface of the skin over the swelling seemed intact. The patient had noted, synchronously with the spread of the eruption, an arrest of the growth of the hair of the scalp, but not elsewhere, the head being covered thinly but continuously with a growth of white hair averaging a quarter of an inch in length. The nails were normal. The patient was somewhat thin, but an alert, active woman. She seemed to have suffered from frequent apparently urticarial attacks, and the tumours themselves seemed to excite itching. Histological examination showed the tumours to be inclusion cysts of the epidermis, lined with stratum corneum, and filled with cocoon-like masses of stratified horn cells. There was no vestige of the skin appendages in the wall of the cysts, which in some instances could be demonstrated to be continuous with the surface of the epidermis on which the cavity opened. (*See Plate XLI.*)

Malignant Disease.—Under this heading Sequeira³ includes carcinoma and a few other rare affections, such as mycosis fungoides, Kaposi's disease, and true sarcoma cutis. Of these, carcinoma is by far the most important and occupies nine-tenths of the paper. Four main groups of cases are recognized: (1) Squamous-celled carcinoma, or 'epithelioma'; (2) Basal-celled carcinoma, which includes most cases of 'rodent ulcer'; (3) Nævocarcinoma, which includes all growths developing on nævi or moles; (4) Paget's disease.

Squamous-celled carcinoma may make its first appearance as a small wart-like growth, often in response to some irritation, such as exposure to strong sunlight, atmospheric changes (*see also* KERATOSSES), and x rays; or chemical stimuli may start the process, as in so-called tar cancer; or the malignant change may arise in tissue which has been damaged by wounds or disease, lupus and syphilis being the most frequent examples of the latter causation. Or the earliest clinical lesion may be in the form of a nodule, which is especially the form affected by malignant disease of the mucous membrane. The essential feature of this group is the early invasion of glands. Histologically, the proliferating cells are of the type of horn cells.

Basal-celled carcinoma has its clinical commencement most often as a nodule, less often as a warty excrescence. When ulceration takes place—and this may be delayed for very long periods—the following varieties may be distinguished: (1) The ulcer cicatrizes spontaneously in the centre and spreads with a beaded rim. (2) It makes no attempt to heal, but spreads slowly and usually superficially, though it may be, deeply also. (3) It undergoes very rapid extension,

PLATE XLI.

MULTIPLE EPITHELIAL CYSTS



Dr. Graham Little

and great destruction may result. The essential characteristic of this form of carcinoma is the absence of glandular enlargements. Histologically the cells composing the growth are usually derived from the deeper layers of the epidermis or its appendages. The prognosis in this group is influenced by the depth to which the disease has penetrated. If cartilage or bone is attacked, the outlook is much more formidable than if only the skin is involved. In the latter event, cure can usually be hoped for.

Nævocarcinoma, often classed in text-books as melanotic sarcoma, usually arises from moles. It is commonly a very malignant form.

Paget's disease, formerly considered to originate in an eczema, has been demonstrated to be epitheliomatous *ab initio*. It is most common in women over forty, and in the region of the nipple, but may occur in other positions, such as the genitals and umbilicus.

TREATMENT.—The methods reviewed are these: (1) **Excision**. This may be affected by the knife or cautery. It is the method of choice for all but the basal-celled type. Affected glands should be removed at the same time. (2) **Radiotherapy**. The method recommended by the author is a curetting of the growth, which is followed by full pastille doses of *x* rays at intervals of ten days to a fortnight. When there is deep infiltration, it may be necessary to give as many as eight pastille doses to the same area in one sitting, the parts being screened with aluminium filters. (3) **Radium**. This is specially recommended for small, freely mobile growths of rodent ulcer. The duration and frequency of application differ greatly according to the strength of the applicators, the depth of the infiltration, and the position of the ulcer. Prolonged exposures are recommended in deeply infiltrated cases, and here, too, screening with lead filters is necessary to prevent radium burns. (4) **Diathermy**. This is a comparatively new process of which the author has had too little personal experience to say much as yet. (5) Freezing by **Carbon Dioxide**. This method the author has also used too seldom to afford any large personal experience of it.

Graham Little¹ reports a series of 118 cases of *rodent ulcer*, the large majority of which were treated by freezing with **Carbon-dioxide Snow**, with results which compare satisfactorily with those of any other form of treatment. An average of three applications of from twenty to thirty seconds each is required for the complete removal of rodent tissue. Recurrences are equally well dealt with by the same means. In the intervals of application of freezing, simple dressings of boric ointment are all that is usually required. The practitioner must assure himself there is no diseased tissue left before dismissing the patient, who is apt to be satisfied with the healing of the ulcer, which often takes place after one application; but there may still be some hardened area left which will call for further treatment.

For **X-Ray** treatment see p. 57.

REFERENCES.—¹*Brit. Jour. Derm.* 1915, 304; ²*Ibid.* 310; ³*Brit. Med. Jour.* 1915, i, 365; ⁴*Pract.* 1915, ii, 58.

SKIN-GRAFTING.*W. I. de C. Wheeler, F.R.C.S.I.*

H. de L. Crawford¹ gives results of the bridge method of skin grafting. Bridges of skin are raised from the abdomen or thigh, and in the case of injury to the upper extremity the raw surface is passed under the bridge and fixed in position with plaster-of-Paris. Six cases of badly scarred hands were treated by this method. In a boy, age 12, the fingers were flexed and the thumb adducted, from scarring of the palmar aspect following burns. After division of the scar tissue the fingers were forcibly extended and the thumb abducted; this necessitated partial rupture of the adductors and flexor brevis pollicis. The raw area exposed occupied about two-thirds of the palm. Its floor consisted of tendons and its edges of fibrous tissue. A bridge of skin was raised from the thigh of the same side, and the affected hand passed underneath. The edges of the bridge were secured to the fibrous edges of the denuded area on the palm. The tips of the fingers were fastened, as was the wrist, by a few points of catgut suture to the skin of the thigh. Copious dressings of wool were applied, and the thigh and arm were secured from independent movement by a plaster-of-Paris bandage. The parts were not disturbed for eight days, when the bridge of skin was separated from the thigh. The raw edges of the graft were sutured to the neighbouring edges of healthy skin at each side of the hand. The wound of the thigh was closed. The fingers were kept extended on a splint for a week and massage and movements persevered in. The result after five weeks was excellent.

Pierce Gould and Archer² advise the use of local anæsthesia in skin-grafting by Thiersch's method. If small grafts were required, endermic infiltration of the skin was employed, and the swelling thus produced facilitated the cutting of the graft. When large grafts were required, subdermal injection above and below and to either side of the skin to be removed was found best. Plain sterile water gave complete anæsthesia when injected into the skin; otherwise a 1 per cent novocain solution, or urea and quinine $\frac{1}{2}$ per cent solution was applied.

Staige Davis³ emphasizes the value of very small grafts, which contain more of the true skin than the original superficial Reverdin grafts. He points out that Reverdin did not, as is generally supposed, employ purely epidermic grafts, but that a little of the dermis was included. "The simplest way to obtain these grafts is to pick up a bit of the epidermis with a straight intestinal needle held in an artery clamp. It is raised so that a little cone is formed, and the base of the cone is cut through by depressing the blade of the knife. (The thinner Reverdin grafts may be obtained by cutting off the tip of the cone.) The graft, still on the needle, is transferred to the wound, with raw surface downward. The grafts are placed in rows, a space of not more than 5 mm. being left between the grafts. When two rows are in place, a strip of dry sterile rubber protective about 1.5 cm. wide is applied over them, so that the lower edge of the protective just covers the lower row of grafts. Then the protective is

pressed down firmly over the grafts with a gauze pledget, and the edges of the grafts will uncurl and spread out evenly on the wound. The next row of grafts is placed close to the edge of the protective, and after two or three rows are applied, they are covered with a second strip of protective, which overlaps the first piece about one-half its width. The protective is pressed down firmly, and the procedure is continued in this manner until the whole wound, or the part selected, is covered. The ends of the protective strips which extend beyond the wound edges may be fastened securely to the normal skin by means of a few drops of chloroform. Moist salt gauze over the protective strips secured by a bandage is a satisfactory dressing. The part should also be immobilized as far as possible. The area from which the grafts are taken may be dressed with boric ointment spread on a sheet of rubber protective, which is snugly strapped over the wound, or with silver foil and dry gauze. The grafts are either round or irregularly oval. They vary between 2 and 4 mm. in diameter, and should seldom be larger than 4 mm. They are thickest in the centre, and taper off towards the edges. With a sharp knife, the size, contour and depth can be judged quite accurately. The wounds left by the removal of the grafts have the appearance of small pits punched in the skin, there being a rim of untouched epithelium between the pits. Fat may be seen in the bottom of some of the pits, which shows that a considerable depth of the skin is used."

REFERENCES.—¹*Brit. Med. Jour.* 1915, i, 1046; *Ibid.* 544; ²*Jour. Amer. Med. Assoc.* 1914, ii, 985.

SMALL-POX.

E. W. Goodall, M.D.

According to H. Campbell Highet,¹ small-pox is endemic in Siam. In Bangkok there seems to be a fairly regular cycle of epidemicity of three or four years. Thirty per cent of the cases occur in January and 19 per cent in December, the coolest months of the year in Bangkok. The general death-rate from the disease cannot be given, as the total number of cases is not known; but of 379 patients treated in the hospital for infectious diseases, 211 died, a fatality of 55.9 per cent. During the epidemic of 1911-12 the total deaths from small-pox were 2368, or 4.3 per 1000 of the population. More than a quarter of the deaths were in infants under one year of age, and 67.2 per cent were in children under ten. The heavy incidence of mortality among children in Bangkok is what has always been found in unvaccinated communities. In some years voluntary vaccination has been practised in certain parts of Siam. Lately, however (February, 1914), vaccination has been made compulsory for Bangkok.

REFERENCE.—¹*Lancet*, 1914, ii, 1043.

SOLDIER'S HEART.

Carey Coombs, M.D., M.R.C.P.

SYMPTOMS.—In this as in other wars the medical officer is constantly confronted with the problem, "Does the state of this man's heart debar him from military service, or not?" Sometimes it is in the new recruit, sometimes in the man invalided home. Of

these latter, some have fallen out owing to cardiac symptoms, others have been condemned at medical inspection of the unit. Taking all these cases together, they are found to fall into three clinical groups.

First, there are cases of frank organic disease. The writer has seen a number of such. One patient had cardio-renal disease, another syphilis of the aorta with incompetence of the aortic valves. Several had mitral stenosis, and some aortic regurgitation, due to old rheumatic infection of the heart, which was also responsible for the largest class of all, cases of ventricular dilatation with more or less mitral incompetence. The preponderance of the rheumatic cases appears to be due to the fact that these lesions are associated with the earlier decades, the years of military service, rather than to any prevalence of rheumatic infection as a result of climatic and other conditions endured by the army. Acute polyarticular rheumatism has been a rare disease, in spite of the wet and exposure of trench warfare. Now, is a diagnosis of organic disease of the heart tantamount to a sentence of unfitness for military service? Fiessinger¹ and Martinet,² among others, return an emphatic negative. Each of these writers quotes examples of men serving usefully in the French Army with unmistakable organic disease of the heart. The first insists on the increased possibilities of service open to the man who maintains his cardiac force with small doses of **Digitalis**. The second reminds us that the fundamental principle which underlies the treatment and prognosis of all cardiac disease, is to attend to such evidences as are attainable of the functional efficiency of the heart. If the patient, in spite of mitral stenosis, is not short of breath on exertion, he is fit for service, according to Martinet.

The second group consists of cases of 'soldier's heart,' in the usual sense to which the term is applied. The army term 'D.A.H.' (disordered action of the heart) is almost synonymous with this. Paradoxical as it may seem, the soldier who comes home with dyspnoea and palpitation nearly always turns out to belong to this group of functional disorders; while the organic lesions are as often as not detected more or less accidentally and in the absence of cardiac symptoms. The patient with 'soldier's heart' finds himself hindered by dyspnoea and palpitation in marches and other such exertions. Sometimes the onset follows some peculiarly strenuous effort, sometimes it appears as an outcome of cumulative over-stress. In a few cases it results from 'shell shock' or other mental stresses. The patient is usually a young soldier, of the tall thin type of build associated with adolescent immaturity. The trouble increases till he is obliged to fall out so often that he has to be invalided. The chief objective sign is tachycardia, though sometimes the pulse is not so much quick as irregular, the inequality being a 'sinus' arrhythmia, i.e., one which originates in the nerve-supply of the heart. In a few cases there are extrasystoles. The pulse is too easily accelerated by excitement and exertion. On examination, the apex beat is displaced outwards, and has a forcible throbbing character. Often a systolic bruit is

audible. This may be of three kinds : (1) There may be a soft systolic bruit heard at the cardiac apex, constant at first in spite of changes in posture and other circumstances, but disappearing altogether after a period of rest in bed. (2) The bruit may be of the cardiopulmonary variety, systolic in time, heard at the cardiac apex and all along the left border of the heart, loudest in inspiration and while the patient is standing up, but diminishing when he lies down, and disappearing altogether in expiration. (3) A third and characteristic type of bruit is heard in systole all along the left sternal border, loudest at the pulmonic area, and varying a little—not so much as the frank cardiopulmonary bruit—with respiration. Sometimes murmurs of this last type are heard late in systole.

Cases of this class are appearing in all parts of the war, as in previous wars. The writer has met with examples among the troops from Gallipoli as well as in the Flanders armies, and the German physicians³ are describing similar cases. Among them, as among ourselves, opinions differ as to prognosis and treatment. In spite of these differences, however, three facts emerge. First, the man who is actually suffering from 'soldier's heart' is of no use for active service in the field unless and until his symptoms subside. Second, improvement is only brought about by adequate bodily and mental rest ; the degree of rest necessary is to be estimated by a consideration of each case on its own merits. Third, in a majority of such cases some improvement is to be expected within a period of weeks, and many of the men become fit for duty again, for home if not for foreign service. No drug treatment seems to serve, though **Bromides** may be used to allay the palpitation if it be disturbing to sleep.

The third group of cases consists of those in whom there are signs which one is not sure how to interpret. Possibly they point to early organic disease. The commonest type is that in which there is an apical systolic murmur, with some dilatation of the left ventricle. In cases of this kind the only safe plan is to keep the man under observation for a few days, preferably in bed, to see whether the signs clear up or persist. If the former, organic disease is ruled out.

DIAGNOSIS.—The whole point is to distinguish between those who are fit to undertake or continue military service, and those who are unfit. Practically, one test suffices to draw this distinction. Is the man out of breath after exertion, or not ? If the examiner is not satisfied of the patient's veracity, he should put the matter to the proof and examine his man before and after smart exertion, such as running up a flight of steps and down again. If the pulse is rapid at examination, and the rate ceases to fall after a reasonable interval of a few minutes, long enough to overcome the patient's nervousness, he should if possible be kept in bed for a few days and examined again. Mackenzie's excellent memorandum⁴ gives many hints of value to the examiner of recruits.

Martinet² proposes the following tests for separating out those with functionally inefficient hearts. With the patient lying down, the

pulse is counted until two successive counts are equal. His systolic and diastolic pressures are measured in the same way. The same tests are next carried out in the same way, with the patient standing up. Finally, the patient carries out rhythmic flexion-extension movements of the lower limbs, say twenty times in as many seconds. Pulse and pressure are measured after this at intervals of a minute up to five minutes, when the patient lies down and the final reading is taken. In the case of a normal person, the movements and exercises will cause a moderate quickening of the pulse-rate, which will return to, or even below, normal in less than three minutes. In the case of the person with functional imperfection of the heart, the acceleration of the pulse is greater, and persists without check for five or ten minutes, or even more.

TREATMENT.—The men with organic disease are not fit for service if they need treatment; though Fiessinger¹ insists on the value of *Digitalis* in moderate continued doses, for keeping the cardiac patient up to his work.

As for the treatment of the functional cases, nothing is of avail except rest. The amount of rest required can only be measured in each case by the progress made. Some men respond to a week in bed; others are no better at the end of several months' quiet living. In nearly all instances it is essential that the return to duty should be gradual. No man with 'soldier's heart' should be sent back direct to the wear and tear of life in an infantry regiment on active service. Mirtl³ thinks that neglected cases may drift into an arteriosclerotic condition.

Godlewski⁵ has found it possible to check attacks of tachycardia following exertion, which appear to mark the onset of the condition in some cases, by stimulating the inhibitory action of the vagus. This is most readily done by giving the patient a fairly large piece of bread to swallow, rest being of course enforced the while.

REFERENCES.—¹*Med. Press and Circ.* 1915, i, 161; ²*Presse Méd.* 1915, 361; ³*Brit. Med. Jour.* 1915, ii, 105; ⁴*Ibid.* 563; ⁵*Presse Méd.* 1914, 723.

SPINAL CARIES. (*Vol.* 1915, *p.* 553.)

SPINAL CORD INJURIES. (*See also* SHELL SHOCK.)

J. Ramsay Hunt, M.D.

The question of operative interference in wounds of the vertebral column with spinal cord symptoms is one of great importance at the present moment. Apparently, injury to this portion of the nervous system has awakened far less interest than similar lesions of either the brain or nerves, probably on account of the gloomy showing afforded by laminectomy in transverse lesions of the spinal cord in civil practice.

Muskens¹ reports on the operative results in two cases of *bullet wounds of the vertebral canal*, and ventures the following conclusions: The absence of all deep reflexes must not be taken as an absolute

proof of complete rupture of the cord. The rapid fluctuation in pressure caused by a passing bullet appears to be sufficient to damage seriously the blood and cerebrospinal fluid circulation in the cord and induce complete flaccid paraplegia. It is probable the pressure exerted by bony splinters is of secondary importance. In cases of paraplegia following on bullet wound to the vertebral column, when there is no recovery of mobility or sensibility ten days after injury, laminectomy appears to be justified. If the opening of the bony canal is not sufficient to restore pulsation in the cord, the theca should be opened and the blood-clot removed as thoroughly as possible.

Marburg and Ranzi² report on a series of thirty-five cases of bullet wound of the cord, and their indications for exploratory laminectomy may be summarized somewhat as follows: In contradistinction to brain injuries, it is essential to wait a considerable time (four or five weeks) until the condition has become stationary before a laminectomy is performed. The operation is contra-indicated in the presence of pulmonary or abdominal complications; also if severe suppurative processes or decubitus is present near the site of operation; also if the case is complicated by a suppurative ascending pyelitis. Mild infection of the urinary tract and granulating bedsores are not contra-indications. In spite of the small clinical material presented, it is evident that severe direct injuries and tangential shots, in contradistinction to indirect injuries, such as compression, œdema, liquor stasis, and local inflammation, are hardly adapted to radical surgical intervention.

Goldstein,³ who has also investigated this subject, advises operation in cases where there are evidences of a transverse lesion and where flaccid paralysis with failure of reflexes persists for some time. The length of time before operation depends in part on the patient's general condition. If this is bad and there are marked bladder disturbances and severe decubitus, not more than three weeks should elapse. Of course, operations may be in vain if the cord is completely severed, and there is no way of telling absolutely from the clinical symptoms whether this is true; but the prognosis is hopeless in these cases anyway, and no harm can be done; whereas, by operating, cases will be saved in which there is any possibility of cure. Operation should always be performed in cases where a bullet can be seen in the spinal canal in the Röntgen picture and the disturbances do not improve.

REFERENCES.—¹*Lancet*, 1915, i, 369; ²*Wien. klin. Woch.* 1915, 113; ³*Deut. med. Woch.* 1915, 215, 250.

SPINAL-CORD SURGERY. (See also SPINAL CORD INJURIES.)

J. Ramsay Hunt, M.D.

There is perhaps no greater field of interest in spinal-cord surgery to-day than that which attends the operation of **Laminectomy** for the relief of compression from spinal cord tumours, cysts, thickened meninges, and diseases of the bony structures. Even decompressive

laminectomy alone has occasionally proved of benefit in doubtful cases which have been explored and where no gross lesion was found. Elsberg¹ reports his operative results in 100 cases at the New York Neurological Institute, and gives many interesting points in their surgical management. Fifty-eight patients were operated upon in whom the diagnosis of a spinal tumour had been made, or in whom a growth could not with certainty be excluded. In 37 of these 57 operations a spinal growth was found. The tumour was extradural in 4 cases, intradural but extramedullary in 19, intramedullary in 9, and malignant disease of the bone was found in 5.

Of the intramedullary tumours, 8 were in the cervical and 1 in the upper dorsal region; of the extramedullary tumours, 5 were cervical, 10 dorsal, 1 lumbar, 4 involved the roots of the cauda equina; in 2 patients there were multiple tumours in the dorsal and lumbosacral cord and around the roots of the cauda equina. In the 21 patients in whom the operation failed to reveal a tumour, complete relief or great improvement followed the exploratory operation in 7 (33 per cent). Among these were examples of multiple sclerosis, neuritis of the cauda equina, hydromyelia, and localized serous meningitis.

He lays especial stress on the operative possibilities even in cases of intramedullary tumour—using a two-stage operation. The first stage consists of laminectomy and incision of the cord over the growth; the wound is then closed and the central tumour allowed to extrude by the action of intramedullary pressure. In the second stage, after an interval of four to seven days the wound is re-opened, and in favourable cases the growth will be found well extruded and easily separated from the cord substance. Great importance is attached to care in handling the cord. If it is necessary to lift it in the extirpation, he advises using a dentate ligament or one of the nerve roots for this purpose. Of the 32 spinal-cord tumours that he operated upon, 2 patients died as a direct result of the operative procedure. Both had intramedullary growths in the cervical region. According to his experience, the danger of a laminectomy for spinal neoplasm is small; the results that may be expected from the removal of intramedullary tumours of the cord are fairly good, if the tumours are well localized and will extrude; the results from the removal of extramedullary growths are very satisfactory if only the patients come to operation early enough, before irreparable damage has been done to the cord.

SPINAL NERVE ROOTS, RESECTION OF. (*See RHIZOTOMY.*)

SPLEEN, SURGERY OF. (*See also SPLENOMEGALY, Vol. 1915, p. 557.*)
E. Wyllys Andrews, M.D., F.A.C.S. (Chicago).

Elliott and Kanavel¹ discuss in full, with bibliography and case reports, the status of splenectomy for hæmolytic icterus. The writers report two cases of their own with full pathological findings, especially the fragility tests, which were worked out on the members of

different families and on the circulation of dogs. Forty-eight cases collected from the literature, most of them with full blood examinations before and after operation, are carefully tabulated in this paper. The first reported case, by Banti, was performed in 1903, and reported in 1912. Other early operators were Micheli, Spencer Wells, Bland-Sutton, and Baquez. The earlier cases were performed without the diagnosis of hæmolytic jaundice being fully made. The technique of splenectomy is not especially difficult, particular care being necessary, of course, that the ligature on the pedicle cannot by any possibility slip. Of the 48 cases reported, only 2 died. The effect on the blood picture was immediate, the gain being from two to four million reds in two weeks. The effect on the fragility of the red cells was less conspicuous, one case becoming normal in five weeks; but Sir Spencer Wells's case showed a high fragility twenty-seven years after operation. The jaundice decreased in most cases. The bibliography of this operation is surprisingly small.

REFERENCE.—¹*Surg. Gyn. and Obst.* 1915, ii, 21.

SPLENECTOMY. (See ERYTHRÆMIA.)

SPLENIC ANÆMIA.

Herbert French, M.D., F.R.C.P.

ETIOLOGY.—Yates, Bunting, and Kristjanson¹ report that they have obtained pure cultures of diphtheroid organisms, apparently identical with or closely related to the *Bacillus hodgkini*, from two spleens removed surgically in the treatment of splenic anæmia. To prevent contamination from external sources, the spleens were carefully sterilized externally by boiling before cultures were made from their interior; inoculation of dogs and rabbits was carried out with cultures of the organism obtained, and the resultant changes produced were similar to those characteristic of the disease as described by Banti. These findings are significant in view of the results reported by Gibson,² who found that stained sections from six cases of splenomegaly exhibited Gram-positive streptotrichal organisms, at times segmented and, at times, appearing as bacillary forms. Research work along these lines may prove that there is a direct bacterial relationship between Hodgkin's disease, splenic anæmia, and, perhaps, other varieties of splenomegaly.

TREATMENT.—Further cases of the treatment of splenic anæmia by **Splenectomy** are being recorded, some with good results, others the reverse. McKendrick³ records, with full details, an instance in a girl, age 8, whose spleen after removal was twice the normal weight, and who, eighteen months after the operation, was reported as being perfectly well, with no trace of anæmia, looking the picture of health and not the poor anæmic child she was previously. One remarkable point in this case was the very rapid increase that took place in the formation of red blood-corpuscles within twenty-four hours of the splenectomy. McKendrick argues from this that the spleen was probably a very active blood-corpuscle destroyer. Barling⁴ reports

three cases: in one the result of splenectomy was excellent after other measures had failed; and the man, previously incapacitated by his anæmia and recurrent hæmorrhages, was able to work as a railway porter: in this case the spleen weighed 4 lb. The second case, whose spleen weighed 3 lb. 5 oz., improved immediately after the splenectomy, but the improvement proved temporary only, though the final result in this case is not known; he was rapidly losing ground again when last heard of. In the third case the patient, a girl, age 6, died on the fourth day after the operation, the cause of death being apparently post-operative shock. Jack and Frew⁵ report one case in a woman, age 37, in whom all precautions were taken to make sure of the diagnosis of splenic anæmia. Medicinal treatment failing to relieve her, splenectomy was performed, the excised spleen weighing 1 lb. 10 oz. In spite of considerable hæmorrhage at the time of the operation due to friability of the vessels, and in spite of some pneumonia complicating convalescence, she recovered steadily, and five months afterwards she was very much better than she had been before the operation, and had been able to resume her household duties. In this case enlargement of the liver, which had been present before the operation, subsequently disappeared.

Sturgis⁶ records details of a case of Banti's disease in a boy, age 18, treated successfully by splenectomy. The spleen weighed 800 grams. Medicinal treatment was tried previous to operation, but there were recurrent attacks of hæmatemesis, and the patient was going steadily downhill. The liver was not enlarged, but there was some ascites. Fourteen months after splenectomy the patient appeared to be in excellent health, but the blood still showed some degree of anisocytosis and poikilocytosis, whilst the differential leucocyte count exhibited a relative lymphocytosis. Another case of splenic anæmia (Banti's disease) treated by splenectomy is reported by Herrick.⁷ This patient was clearly in the first stage, and, as with so many other cases that are being recorded, it still remains to be seen what the final result will be; but the condition subsequent to the operation itself was a return to a complete sense of well-being, with a rise of the hæmoglobin to normal, and apparent restoration to perfect health.

Splenic Anæmia in Childhood.—Thursfield⁸ reports a case of *congenital acholuric jaundice*, with a liver one inch below the costal margin and a spleen reaching to within an inch of the iliac crest, in a boy, age 9, in whom splenectomy led to apparent cure when other treatment had failed entirely. French and Turner⁹ record an equally favourable result of splenectomy in a boy, age 5, suffering from splenic anæmia infantum. The excised spleen weighed 18 oz. Sargent¹⁰ reports a case of splenic anæmia in a girl, age 10, greatly relieved by splenectomy, although the ascitic stage had been reached before the operation. The spleen weighed 16 oz.

Hoffmann¹¹ reports a case of splenic anæmia with recurrent hæmatemesis in a girl of 12, apparently cured by splenectomy.

Familial acholuric jaundice is generally characterized by great

enlargement of the spleen and a degree of jaundice which fluctuates, but which is generally unassociated with the appearance of bile pigments in the urine. Numerous observers have shown, however, that the presence of bile pigment in the urine does not exclude the diagnosis of familial acholuric jaundice, for in not a few instances the urine does contain bile pigments during the exacerbations of the jaundice, being absent when the jaundice becomes less deep. Some newer designation than 'acholuric' is therefore needed, as Whipham¹² points out in recording a case of this malady in a girl of 6, who had been born jaundiced, and had at no period been free from jaundice. The urine in this case contained bilirubin constantly, and no urobilin. She was going down hill rapidly, her red corpuscles having fallen to 994,000 per c.mm., when splenectomy was decided upon. The blood improved immediately, and a fortnight after the operation the red cells had risen to 4,224,000 per c.mm., and later rose higher still. That the splenectomy was enormously beneficial for the time being seems beyond doubt; but the operation did not cure the disease, for three and a half months later severe epistaxis occurred, with recurrence of jaundice, she grew worse rapidly, and died in three days. No necropsy was allowed.

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1914, ii, 2225; ²*Quart. Jour. Med.* 1914, Jan. 153; ³*Pract.* 1914, ii, 650; ⁴*Lancet*, 1915, i, 220; ⁵*Glasgow Med. Jour.* 1914, ii, 329; ⁶*Boston Med. and Surg. Jour.* 1914, i, 832; ⁷*Ann. Surg.* 1914, i, 690; ⁸*Brit. Jour. Child. Dis.* 1914, 219; ⁹*Ibid.* 218; ¹⁰*Ibid.*; ¹¹*Ibid.* 225; ¹²*Lancet*, 1914, ii, 1194.

SPLENOMEGALY. (*Vol.* 1915, *p.* 557.)

SPOROTRICHOSIS. (*See also* NOSE, DISEASES OF.)

E. Graham Little, M.D., F.R.C.P.

Sutton¹ reports five cases of sporotrichosis seen by him during eight months, a prevalence which would argue an unsuspected frequency of the disease in the Middle West. In four of the five cases the diagnosis rested on clinical data; in only one was the organism demonstrated. The symptoms were very similar in all five cases, with a usual history of slight injury to the finger or hand, followed by an indolent ulceration, and the formation of nodules running up the course of the lymphatics from the original site. With the usual treatment by administration of **Iodide of Potassium**, the cases all did well.

REFERENCE.—¹*Jour. Amer. Med. Assoc.* 1914, ii, 1153.

SPRUE.

Sir Leonard Rogers, M.D., F.R.C.P.

A. Castellani¹ discusses the hyphomycetes found in sprue, and the classification of fungi of this class. Several different varieties have been met with in the gastro-intestinal contents in sprue, which may be the cause of such symptoms as frothiness of the stools; but he does not think that they are the cause of the disease, only a secondary development, as they are frequently found in other diseases. He does not agree with Bahr in regarding *M. albicans* as the primary cause of the disease. Moreover, Castellani holds that the fungi met

with in sprue do not belong to the same species as the so-called thrush fungus or *M. albicans*, as stated by Kohlbrugge and those who have followed him; but that six different species are present, which he names and describes, including their sugar reactions.

B. K. Ashford² has found sprue to be a most important disease in Porto Rico, where cases of fermentative indigestion with much formation of gas are exceedingly common and may go on to sprue if not treated properly. A pure milk diet of 80 increased to 117 oz. is best, followed by nitrogenous—fresh vegetable and fruit—diet, including bananas, but no carbohydrate. He has found a monilia in forty-nine cases of sprue, and in 17 per cent of flatulent dyspepsia cases (but in only 3 per cent of healthy persons), which caused gas-formation and diarrhoea in animals. He found yellow santonin to be useless, and emetine nearly so, in sprue. The flatulent dyspepsia cases also respond to dietetic treatment, although drugs are of little value.

REFERENCES.—¹*Jour. Trop. Med.* 1914, 305; ²*Amer. Jour. Trop. Med.* 1915, July, 32.

SPUTUM, EXAMINATION OF. (*Vol.* 1915, *p.* 566.)

STAMMERING.

J. S. Fraser, M.B., F.R.C.S.

Blumel believes that stammering is due to a defective auditory memory for vowel sounds, 'a transient auditory amnesia.' Dan McKenzie,¹ however, points out that it is difficult to accept this theory, because many stammerers stammer both upon vowels and upon consonants. There is also a type of stammerer who habitually interpolates a sound like 'eh-eh-eh' between whole words. Further, we have the silent stammerer, who makes an aphasic pause in the midst of an otherwise perfectly continuous flow of words. These three types cannot be explained by the vowel-sound theory. In investigating the stammerer's defect we must pay attention to his whole habit of life and conversation. Adult speech is enunciated in groups or in waves of sound; it is a current, short or long, of variable volume and of variable wave length, according to the nature of the contained ideas. In each wave or impulse an idea-group of words is poured out from the higher speech centres upon the lower co-ordinating and motor centres for arrangement and distribution among the many muscles of expiration, phonation, and articulation, from the diaphragm to the lips. Speech is thus produced by the outpouring of a series of nerve-impulses issuing from the fountain-head somewhat jerkily and irregularly, and transformed into a more even current by subordinate and semi-independent nerve centres as it is broken up and distributed at the various cell stations. The harmonious working of the machinery may be interrupted or brought to a stand by one of two factors: (1) An excess of emotion, which may produce a discharge explosive in its violence, too great, too sudden, and too rapid for the lower neurones to arrange and distribute. Such excesses of emotion cause stammering in perfectly normal people who may be 'speechless with fear' or 'choked with

rage.' (2) Weakness of the co-ordinating and distributing centres due to bad training (habit) or disease. In other words, the cause of stammering, whether occasional or habitual, is a relative weakness of the co-ordinating mechanism of speech. If a stammerer be carefully watched, it will be seen that his defect is most troublesome at certain periods in his speech. First of all, the beginning of a phrase or a sentence, whether the first word begins with a consonant or a vowel, presents an obvious difficulty to him. That obstacle successfully cleared, a flow of speech ensues, in the course of which, however, the stammer again intervenes, and this time a particular word constitutes the obstacle. This process is repeated again and again, each stammer marking the arrival or the culmination of a wave of impulses from the higher centres. All acknowledge that stammerers are at their worst when charged with high emotion. As Wyllie has pointed out, stammerers are people with an easily excited nervous system. Normally we naturally emphasize the more important words, e.g., a substantive receives more stress than its preposition. This slightly greater prominence is sufficient to render these words a stumbling-block to the stammerer. Thus, in the sentence, "He gave me five pounds," after the preliminary stammer, a break will occur upon that one of the following words which to the speaker's mind appears to be the most important and therefore to call for emphasis. Most stammerers stutter more over consonants than over vowels. The most troublesome consonants are the explosives (b, t, d, etc.), and the most troublesome words are those which begin with these letters. When the flow of speech is obstructed, the motor neurones go on repeating the consonant, because it is easier for the halting speech to hang on to a consonant than on to a vowel sound. Kinæsthetically a vowel is less easily enunciated than a consonant.

A century ago, Erasmus Darwin introduced a method of treating stammerers in which the patient is taught to elide or depress the initial letter of the word when pronouncing words beginning with a consonant, i.e., the patient starts off with the vowel. McKenzie believes that by this method the weak co-ordinating centres are coaxed to enter upon their task.

The surprising fact that there is, as a rule, little or no stammer when a stammerer is singing, reciting, or reading aloud, is probably due to a combination of favourable circumstances. The patient's mind is not excited, because he is not engaged in independent action. As the stammerer is led by the hand, so to speak, all hesitation is banished. The rhythm of the speech is already fixed, and so the mental process is almost purely automatic. McKenzie holds that habitual stammering is preventable. It can be eradicated if the habit is but newly acquired. Once it is firmly established, stammering, like any other bad habit, cannot be cured. At the best it can only be improved, by being modified or disguised.

REFERENCE.—¹*Jour. Laryngol. Rhinol. and Otol.* 1915, 201.

STATUS LYMPHATICUS. (*Vol.* 1915, *p.* 568.)

STERILITY IN THE MALE. (*Vol.* 1915, *p.* 569.)

STOMACH, CANCER OF.

Robert Hutchison, M.D., F.R.C.P.

Friedenwald,¹ in an elaborate statistical study of 1000 cases of gastric cancer, concludes, from the clinical history, that in only 23 per cent could the cancer have formed from an ulcer. This is in direct opposition to the views of Wilson and McDowell,² based upon the investigation of tumours removed at the Mayo clinic, which has led them to the conclusion that "gastric cancer rarely develops except at the site of a previous ulcerative lesion of the mucosa." Friedenwald also found that pain is the most frequent of all symptoms of cancer of the stomach, occurring in 93 per cent of the cases. He found, too, that periods of temporary improvement, including gain in weight, are not uncommon in the course of the disease.

Of the entire number of his cases, operations were performed in 266 (26.6 per cent). Of these, 138 (51.8 per cent) were exploratory operations. Gastro-enterostomies were performed in 98 (36.9 per cent); gastrostomies in 25 (7.8 per cent); and pylorectomies and gastrectomies in 9 (3.3 per cent). Of all these there is not one patient living. It is therefore evident that the early diagnosis of cancer of the stomach is still fraught with difficulty, and that, until more certain methods are available, exploratory incisions should be urged upon all persons over forty years of age having gastric symptoms which are not relieved after a few weeks' treatment. Especially is this the case if there be some loss of flesh, an absence of free hydrochloric acid in the gastric contents, and occult blood in the stools. Even under these conditions many cases will be operated on too late, as there can be no question but that gastric cancer may be present for some time and may assume considerable proportions even before marked symptoms of indigestion are manifested. Inasmuch as in a certain proportion of cases gastric ulcers become cancerous, it is well in all operations for gastric ulcers to consider the advisability of performing excision or partial gastrectomy to prevent any possibility of the transition of ulcer into cancer.

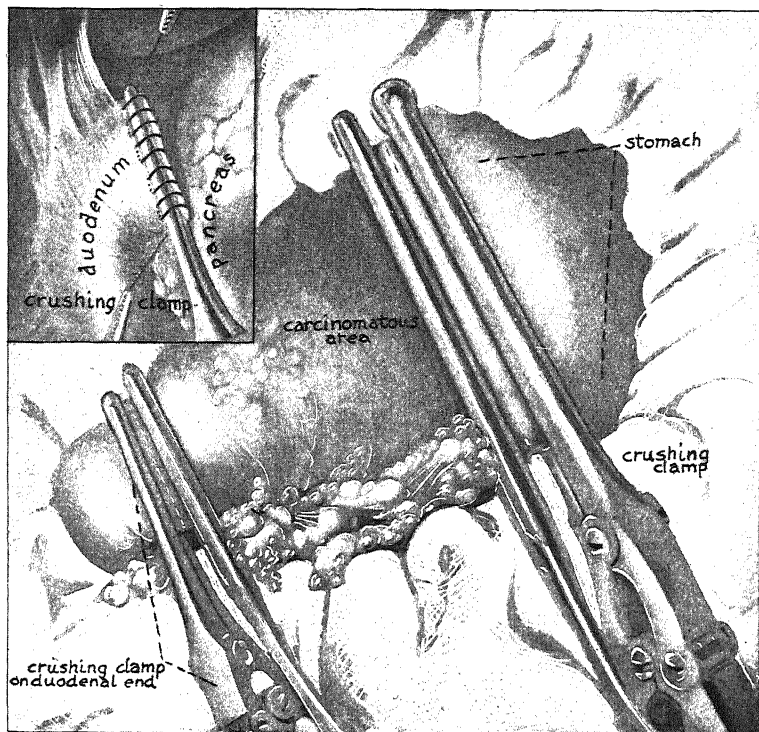
White and Leonard³ have made use of the *x* rays in the early diagnosis of gastric cancer, but with not much success. They believe, however, that while our *x*-ray evidence of *early* cancer is very scanty, the method will occasionally aid in its detection, and it should be given a trial in every suspected case.

They conclude that "in spite of limitations and errors, the *x*-ray evidence has distinctly improved our diagnosis. We have studied the *x*-ray findings in connection with the other clinical data, and have not attempted to build a diagnosis on *x*-ray data alone. This addition of the *x*-ray method to our other examinations gives an accuracy and completeness to our diagnosis impossible with either alone.

"In addition to aiding in diagnosis, the *x*-ray evidence has definitely

PLATE XLII.

W. J. MAYO'S METHOD FOR GASTRECTOMY

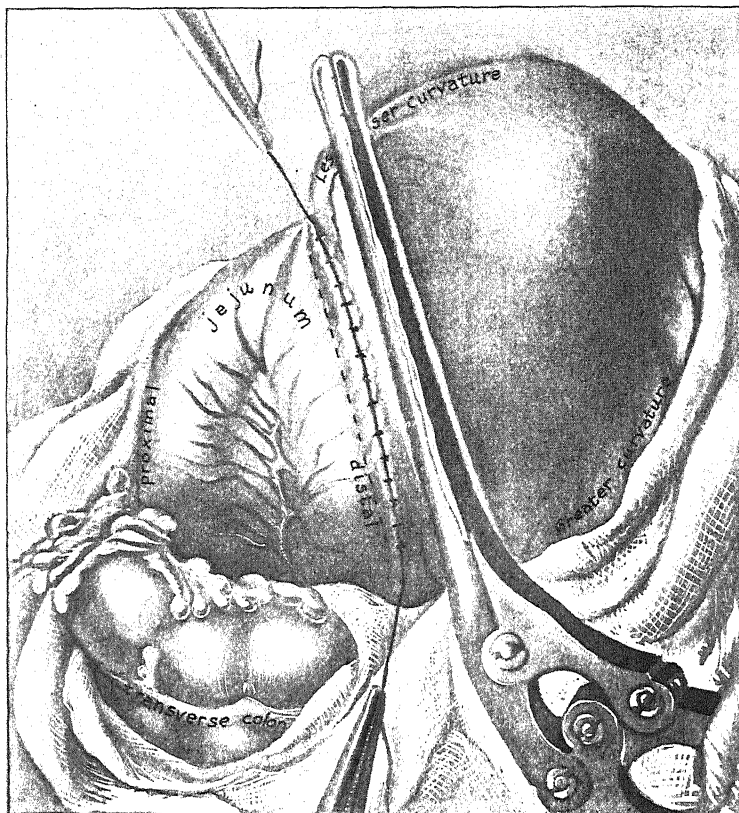


Blood-vessels tied, glands separated, crushing clamps in place, and also clamps to prevent leakage from the part to be removed. The upper left drawing shows the stump of the duodenum in the crushing clamp with suture placed for closing.

Redrawn from 'Surgery, Gynecology, and Obstetrics.'

PLATE XLIII.

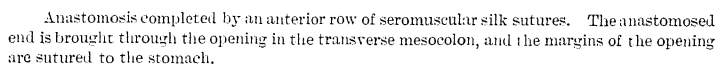
W. J. MAYO'S METHOD FOR GASTRECTOMY—*continued*



The upper jejunum six to twelve inches from the origin brought through an opening which has been made in the transverse mesocolon and united by an outer row of seromuscular silk sutures to the posterior wall of the stomach.

Redrawn from 'Surgery, Gynecology, and Obstetrics.'

W. J. MAYO'S METHOD FOR GASTRECTOMY—continued



MEDICAL ANNUAL, 1916

located the cancer, shown its size and extent, and helped decide about operability. It may show that a cancer with marked symptoms is small and mobile and ideal for operation."

REFERENCES.—¹*Jour. Amer. Med. Sci.* 1914, ii, 660; ²*Ibid.* 796; ³*Boston Med. and Surg. Jour.* 1914, ii, 512.

STOMACH, CARCINOMA OF (Surgical Treatment).

E. Wyllys Andrews, M.D., F.A.C.S. (Chicago).

W. J. Mayo¹ discusses a new or improved technique for gastrectomy and pylorotomy. After closure of the duodenal stump by inversion and transverse or oblique resection of the stomach at any line selected, the open lumen, instead of being closed by inversion, is attached directly throughout its entire length to a corresponding large opening in the convex border of the jejunum. The upper jejunal aspect and the posterior stomach aspect are first attached with sero-serous stitches for a distance equal to the transverse diameter of the stomach. An opening of equal length is then made in the jejunum. Connell or Czerny-Lembert stitches are then used in the deeper layers. The union is completed by a similar double row of stitches in the anterior layers. (*Plates XLII, XLIII, XLIV.*)

Deaver² advises exploration as early as possible in all patients having possible carcinoma of the stomach; or, as Friedenwald has stated it, exploratory incision should be urged on all persons over forty years old having gastric symptoms not relieved by a few weeks' medical treatment. Cancer of the stomach causes about 1 per cent of the total death-rate; but of these, less than 1 per cent come to the surface, and less than one-quarter are suitable for operation. Cancer of the stomach varies greatly in its degree of malignancy; hence certain cases not involving metastases of the lymph-nodes or adjacent organs lend themselves to surgical interference with a good prospect of cure. The combined statistics of large clinics indicate that 20 to 30 per cent of all gastrectomies for carcinoma will live more than three years after operation, and that from 10 to 20 per cent will outlive the five-year period. These figures can be much improved by earlier surgery.

Sherren,³ reporting cases of carcinoma of the stomach from the London Hospital, finds the percentage of irremovable tumours at operation far too great. There are two ways in which the present results can be greatly improved; by prevention and by early operation; also by submitting cases of chronic gastric ulcer to surgical treatment early, since the diagnosis of carcinoma of the stomach at an early stage is impossible except by exploration. All signs that are sure are late signs. The writer agrees that a certain percentage of cases follow directly upon gastric ulcer, quoting Wilson and MacCarty's work, in which 109 out of 153 cases, or 71 per cent, had supervened on chronic gastric ulcer. In a later paper the writer reviews 684 specimens. Of these, 472 showed the character of simple ulcer, and the presence of carcinoma, and 191 ulcers without carcinoma. He also calls attention to conditions mistaken for carcinoma

before operation. These are appendix dyspepsia and gall-stone irritations. The treatment consists in abdominal exploration in every suspicious case; even if carcinoma is not discovered, surgery is the only relief of the more chronic conditions. In opening the abdomen he thinks mid-line incisions should be abandoned, preferring an opening one inch to the right of the middle line. The stomach, when exposed, should be examined from end to end, and any ulcers found most carefully inspected for signs of malignancy. The operation of choice is partial gastrectomy, where there is the slightest suspicion of malignancy, but no practical method has been found for removing carcinoma at the cardiac end of the stomach. Gastro-jejunostomy is of striking service in relieving symptoms of pyloric obstruction only.

REFERENCES.—¹*Surg. Gyn. and Obst.* 1914, ii, 683; ²*N. Y. Med. Jour.* 1915, ii, 8; ³*Pract.* 1914, ii, 463.

STOMACH, SYPHILIS OF.

Robert Hutchison, M.D., F.R.C.P.

Syphilitic disease of the stomach has recently attracted a good deal of attention, and is believed not to be so uncommon as was formerly supposed. The stomach may be affected both in the acquired and in the congenital form of syphilis, the manifestations occurring in the tertiary stage. The lesion usually begins as a gummatous deposit in the submucosa which invades the mucous membrane and leads to ulceration and subsequent cicatrization. In other cases it takes the form of a gummatous tumour usually situated near the pylorus. Chronic gastritis of syphilitic origin may also occur. In others a diffuse syphilitic infiltration of the whole stomach takes place, causing a more or less marked thickening of its walls. This must be differentiated from sclerosing gastritis, linitis plastica, and diffuse carcinomatosis.

There are no symptoms or signs which are absolutely distinctive of gastric syphilis. Cases may simulate ordinary gastric catarrh, ulcer, or carcinoma, but especially ulcer. The pain, however, usually lacks the periodicity of ordinary ulcer and is not so much influenced by food. Vomiting is common, but hæmatemesis rare. Gummatous tumours may closely resemble carcinoma, but the history is more prolonged, and there is less cachexia. Tumours which do not alter in size or shape over a long period, and those which involve the pylorus but do not produce blocking, are often syphilitic. As regards the gastric contents, low acidity, sometimes amounting to achylia, is the rule in all syphilitic cases.

When all is said and done, however, it is upon the results of a Wassermann test and the effects of antisyphilitic treatment that a positive diagnosis must usually be based, and, as in all uncommon diseases, to have the possibility of its occurrence present to one's mind is the best safeguard against error. Illustrative cases are reported by Einhorn,¹ Morgan,² Downes and Le Wald³ and Smithies.⁴

REFERENCES.—¹*Med. Rec.* 1915, i, 421; ²*Amer. Jour. Med. Sci.* 1915, i, 5, 392; ³*Jour. Amer. Med. Assoc.* 1915, i, 1824; ⁴*Ibid.* 1915, ii, 572.

STOMACH AND DUODENUM, ULCER OF.

E. Wyllys Andrews, M.D., F.A.C.S. (Chicago).

Ulcer of stomach and duodenum is discussed by von Eiselsberg,¹ with the review of his experience accumulated in the past ten years. It is most important, in his opinion, to know whether an ulcer exists unhealed or as an old scar, and whether it is at the pylorus or at a distance from it. In spite of the improved methods of examination, such as laboratory tests and *x* rays, the choice of operation can best be determined by autopsy *in vivo*; that is, after the abdominal cavity is opened. These operations are among the finest achievements in modern surgery, and the results fill the surgeon with pride and satisfaction when, as in many cases, the patient is rescued from chronic pyloric stricture and restored to perfect health. Gastro-enterostomy especially has given a large number of beneficial results, and it has taken the place of nearly all other surgical measures for duodenal and gastric ulcer. The writer's cases include 334 gastro-enterostomies, of which 17 died (5 per cent). Of the 317 recoveries, 48 were operated upon in the current year. Thirteen patients, or about 10 per cent of those who had been traced and died of other causes later, had cancer of the stomach. A small percentage of peptic ulcers of the jejunum presented a very serious complication, which repeated operations failed to relieve. Von Eiselsberg observed this formidable complication in so many cases that he thinks serious account should be taken of it. In his opinion, great care in the after-treatment may go far in prevention of development of peptic ulcer in the jejunum. Forty-one cases were also operated upon by this surgeon by resection. Only two deaths occurred in this series, most of which were by Billroth's second method, which speaks highly for its efficacy. Finally, a series of cases of jejunostomy alone was performed, with high mortality, mainly due to its selection for the weakest and worst cases. There were 24 such cases and 12 deaths, 8 from peritonitis, 1 from hæmorrhage.

The following rules are laid down for choice of methods: (1) For acute perforations, laparotomy with irrigation of the peritoneal cavity, with or without gastro-enterostomy. (2) For hæmorrhage it is better not to operate. Expectant treatment seems to give the best percentage of recovery. (3) In typical stenosis of the pylorus, 60 per cent were cured by gastro-enterostomy. (4) Unilateral pyloric exclusions, first done by von Eiselsberg in 1894, give the greatest security and percentage of cures, especially in fresh and bleeding ulcer. (5) For ulcer distant from the pylorus, gastro-enterostomy is not so successful, apparently giving but 34 per cent of successes. (6) High hydrochloric-acid values of the gastric juice favour post-operative peptic ulcer, and detract from the value of gastro-enterostomy. Insisting on the value of autopsy *in vivo*, the writer states that in exploratory laparotomy he often refrains from doing what he terms 'a concession gastro-enterostomy.' (7) In cases of ulcer distant from the pylorus, with high hydrochloric acid, he thinks that transverse

resection is the operation of choice, and especially if there is the least suspicion of tumour formation. This is based on the fact that 41 cases died later of carcinoma out of 269 patients on whom he had performed gastro-enterostomy.

Sherren² declares that the operation of choice is decided after the abdomen is opened. He reports in this paper 200 cases of chronic gastric ulcer, and 224 of chronic duodenal ulcer. This does not include cases of acute perforations. These may be tabulated as follows :—

OPERATIONS FOR GASTRIC ULCER.

Operation	No. of cases	Deaths
Excision and gastrojejunostomy ..	24	0
Partial gastrectomy	9	2
Gastrojejunostomy	138	2
Single gastro-enterostomy ..	18	1
Double gastro-enterostomy ..	2	0
Partial gastrectomy	3	0

Peck³ discusses the choice of procedure in benign lesions of the stomach and duodenum, reporting the work of himself and colleagues since Jan. 1, 1910.

The cases were distributed as follows :—

Chronic duodenal ulcer	74
Chronic gastric ulcer	24
Gastric ulcer with hour-glass stomach ..	6
Perforated duodenal ulcer (acute) ..	17
Perforated gastric ulcer (acute) ..	13
Total ..	134

The operative procedures employed were :—

Simple gastro-enterostomy for	
Chronic duodenal ulcer	72
Chronic gastric ulcer	13
Hour-glass stomach	1
Perforated duodenal ulcer	12
Perforated gastric ulcer	4
Total ..	102

Gastro-enterostomy with excision of ulcer for	
Chronic gastric ulcer	3
Chronic duodenal ulcer (pylorectomy) ..	1
Gastro-enterostomy with pyloric exclusion (secondary) for	
Chronic duodenal ulcer	1
Gastro-enterostomy with cautery puncture for	
Chronic gastric ulcer	1
Gastro-enterostomy with gastroplasty for	
Hour-glass stomach	1
Total ..	7

Excision of ulcer without gastro-enterostomy for					
Gastric ulcer	2				
Partial gastrectomy for					
Gastric ulcer	3				
Transgastric resection for					
Gastric ulcer	1				
Suture of perforation without gastro-enterostomy for					
Perforated duodenal ulcer	5				
Perforated gastric ulcer	9				
Gastrogastrostomy for					
Hour-glass stomach	1				
Gastroplasty for					
Hour-glass stomach	3				
Exploratory cœliotomy for					
Chronic gastric ulcer	1				
Total ..	25				

There were 17 cases of acute perforated duodenal ulcer in the series, with 2 operative deaths, one due to subphrenic abscess and one to post-operative pneumonia. In one of the fatal cases gastro-enterostomy was performed, and was not drained (death from pneumonia). In the other, the perforation was sutured; drainage was used, and no gastro-enterostomy was done (death on the twenty-second day from subphrenic abscess). No patient died of extension of the peritonitis. Primary gastro-enterostomy was performed in 12 of the 17 cases. Two patients died subsequently, shortly after leaving the hospital; one of hæmorrhage, the other of pulmonary tuberculosis.

Hamburger and Leach⁴ discuss the operative procedures in gastric and duodenal ulcer, especially as to their influence on gastric motility and secretions. The cases forming the basis of this study were 17, 9 gastric and 8 duodenal, obtained from the regular medical and surgical service of the Michael Reese Hospital, Chicago. Of these, 8 received no benefit or only partial relief from operation, while 9 were nearly or completely cured. After a period averaging three months to two years, the 17 patients were subjected to careful *x*-ray examination, with test breakfast and motor meal in the laboratory of the hospital. From this series, the following conclusions may be drawn. Gastro-enterostomy done without definite indications is liable to convert normal gastric function into abnormal. With definite surgical indications it is also liable to fail and to increase stasis and hypersecretion unless the pylorus is excluded. The best results are obtained by pylorotomy plus gastro-enterostomy. The conversion of normal to abnormal function is due to pylorospasm or post-operative hypersecretion.

Collinson,⁵ of Leeds, discusses present-day problems in the surgery of gastric and duodenal ulcers. Admitting that Sir Berkeley Moynihan and the Mayos in America have very completely covered this form of surgery, he thinks there are still certain complications and varieties of ulcer about which surgical opinion is not yet crystallized. In perforated ulcer he insists that the mortality is almost entirely dependent upon delay in operating, and emphasizes speci-

ally three leading symptoms: sudden onset of violent pain; short duration of shock or collapse, and board-like rigidity of the abdominal muscles, especially above. He also discusses the advisability of adding gastro-enterostomy to the closure of the perforation. As to this step, his own experience corroborates that of Ellsworth Elliott, of New York, and of the Edinburgh surgeons, that omitting gastro-enterostomy has caused no bad results. Of the writer's 33 cases of perforated ulcer with recovery, 28 were ulcers of the pylorus or duodenum; 13 were treated by suture alone, 15 by suture and gastro-enterostomy. Discussing the question of excision of ulcers, and including 1000 cases of ulcer reviewed by Mayo, he thinks excision alone has been disappointing, and has preferred to add gastro-enterostomy, with or without excision, for chronic ulcer and its complications. The value of excision is increased, in his opinion, by the undoubted evidence that carcinoma springs up on old ulcer bases.

W. J. Mayo⁶ reviews the subject of surgical treatment of chronic duodenal ulcers. The writer reported, as early as 1904, 58 cases of undoubted duodenal ulcer operated upon by himself and C. H. Mayo. Since that time they have been still further impressed with its great frequency. Stimulated by the work of Moynihan and Robson, whose observations agreed with their statistics, they have been developing this type of surgery more and more. In their cases the percentage of duodenal to gastric ulcer increased from 27 per cent in 1904 to 73 per cent in 1914. This difference is largely due to more careful diagnosis. The idea that duodenal ulcer was more frequent than gastric ulcer was slowly evolved. Mayo thinks that the history of the natural course of chronic duodenal ulcer makes cure by medical means open to question. As to recurrence after operation, this is most often due to defective technique. Usually a gastrojejunal stitch ulcer occurred from the use of continuous silk or linen thread. These may hang in the wound for weeks and months, causing irritation and renewed ulceration.

Perforated gastric ulcer is discussed in a collective report⁷ of 247 cases treated in Edinburgh between 1896 and 1913 by Caird, Stiles, Miles, Chiene, and several other operators. A remarkable increase in the number of cases is reported in the last period of this series, as shown by the following table:—

Year	Number each Year	Year	Number each Year	Year	Number each Year
1896	3	1902	8	1908	16
1897	5	1903	8	1909	19
1898	2	1904	18	1910	22
1899	4	1905	21	1911	16
1900	6	1906	15	1912	21
1901	18	1907	24	1913	21

Recovery followed almost in proportion to the promptness of operative interference. The following table illustrates the most important points statistically :—

Year	No. of Recoveries	No. of Recoveries Operated upon within 12 hours of Perforation	No. of Fatal Cases	No. of Fatal Cases Operated upon within 12 hours of Perforation	Total number of Cases	Total No. of Cases Operated upon within 12 hours of Perforation
1896	1	0	2	1	3	1
1897	1	0	4	1	5	1
1898	1	0	1	0	2	0
1899	1	1	3	2	4	3
1900	1	0	5	2	6	2
1901	5	4	13	3	18	7
1902	5	3	3	1	8	4
1903	5	3	3	2	8	5
1904	9	5	9	2	18	7
1905	12	3	9	2	21	5
1906	8	6	7	3	15	9
1907	16	15	8	2	24	17
1908	13	10	3	0	16	10
1909	11	9	8	1	19	10
1910	12	9	10	4	22	13
1911	10	7	6	2	16	9
1912	16	9	5	1	21	10
1913	15	6	6	2	21	6

Deaver^s discusses certain questions as to the surgical treatment of gastric ulcer. He has observed in his clinic the almost constant association of certain abdominal conditions, especially chronic appendicitis and gall-bladder infection, with duodenal and gastric ulcer, quoting also statistics from other clinics which seemed to show that 20 per cent of such ulcers co-exist with disease of the gall-bladder and appendix. He also finds them associated with infections of the mouth, such as pyorrhœa. While well-directed medical treatment will succeed in healing most acute ulcers, a fairly large number are on their way to chronicity. It is only fair that medical treatment should be given a trial before resorting to surgery. In the quiescent stage many ulcers will be found never really to have healed. It therefore seems proper to seek surgical relief after repeated failures under dietary or medical treatment. In operations for acute hæmorrhage, Deaver finds direct treatment, as by ligation, excision, and so forth, difficult and unsatisfactory. However, he does explore the stomach interior in certain cases. Indirect methods, as by gastro-enterostomy or gastro-duodenostomy, bring about brilliant results in ulcers that are near the pylorus, but are often disappointing in those that are remote from it. Those situated near the lesser curvature, Deaver always excises. Like other writers above quoted, he thinks that the proper surgical treatment of gastric ulcer should be decided after the abdomen has been opened.

Archibald,⁹ of Montreal, describes a method of treating adherent perforating ulcers of the posterior wall and the lesser curvature of the stomach. In these cases transverse resection of the stomach is more than usually difficult and dangerous. It has been thought by Paterson, of London, that the good effect of gastro-enterostomy was due to the reflux of alkaline duodenal juice into the stomach, and that gastro-enterostomy was of benefit by neutralizing the hyperacidity: but Archibald thinks that it more often fails than succeeds in ulcers of the posterior wall unless pyloric exclusion is also practised. Accordingly, he has practised exclusion of the ulcer-bearing area by tying off the stomach above the ulcer with a fascial ligature. In the one case in which this was done the patient did not recover, but the writer is disposed to feel that it is a justifiable and valuable operation.

Rodman¹⁰ reports again on his method of radical removal of the pylorus or ulcer-bearing area for benign ulcers. Gastro-enterostomy not having been followed by uniformly successful results, excision operations have, in his experience, taken their place, and especially in view of the modern tendency to make pyloric closure part of the technique. Rodman finds the gastro-enterostomy mortality to be not less than 5 per cent, while at least one-third of those who survived still suffered from their old symptoms. On account of the number of carcinomas, Rodman agrees with Mayo Robson that excision of the ulcer-bearing area must be more frequently done in the future. Thus, Robson's 112 posterior gastro-enterostomies showed 4 patients who subsequently died of carcinoma. As the ulcers are in 80 per cent of all cases at or near the pylorus, he concludes that pylorctomy would give a better average permanent series of end-results.

Carman and Balfour,¹¹ of Rochester, Minn., discuss the Röntgenological aspect of gastrojejunal ulcer. After gastro-enterostomy, symptoms due to lesions of the jejunum cause considerable perplexity. Often these symptoms are due to another ulcer in the jejunum below the stoma. These are called gastrojejunal or jejunal ulcers. Paterson was one of the first to observe these complications, and his comprehensive paper included cases of true gastrojejunal ulcer by Mayo, Moynihan, Tatlow, Mayo Robson, and Soresi. In thirteen cases examined by *x* rays, no characteristic symptoms were found pathognomonic of secondary ulcer. Assistance from the *x* rays might reasonably be expected in the diagnosis. In the cases described in this paper, all were of the non-fistulous type. *Plate XLV* shows the location of the secondary ulcer in both cases near the gastrojejunal opening.

Hæmorrhage said to be checked in many instances by **Blood Transfusion** (p. 8); **X-ray** diagnosis in (p. 49).

REFERENCES.—¹*Surg. Gyn. and Obst.* 1914, Nov.; ²*Ibid.*; ³*Jour. Amer. Med. Assoc.* 1915, ii, 659; ⁴*Ibid.* i, 1245; ⁵*Ibid.* 1914, ii, 1184; ⁶*Ibid.* 1915, i, 2006; ⁷*Edin. Med. Jour.* 1914, ii, 455; ⁸*Jour. Amer. Med. Assoc.* 1914, i, 325; ⁹*Ann. Surg.* 1914, ii, 336; ¹⁰*Surg. Gyn. and Obst.* 1915, Jan.; ¹¹*Jour. Amer. Med. Assoc.* 1915, ii, 227.

PLATE XLV.

GASTROJEJUNAL ULCER—SHOWING SECONDARY ULCER

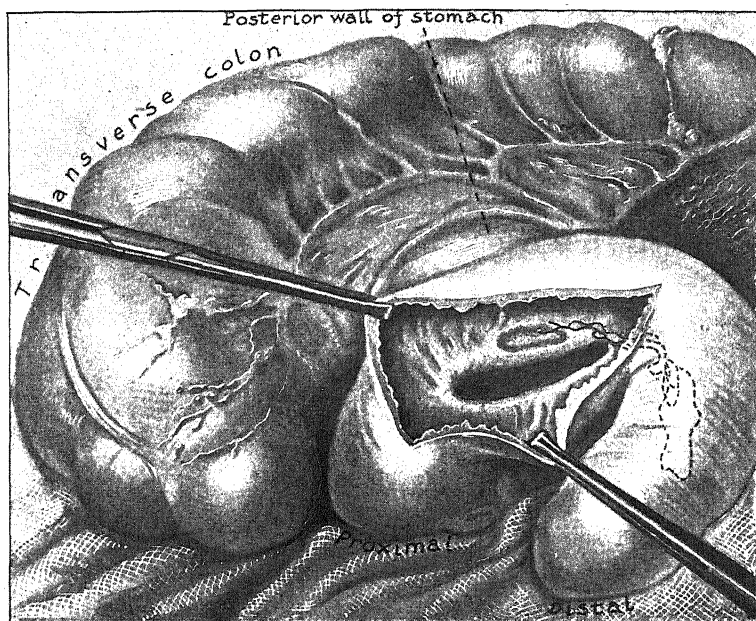


FIG. A.—A stitch attached in the gastrojejunal ulcer, with the end hanging in the jejunum. Note the scar tissue behind the ulcer causing permanent thickening and adhesions.

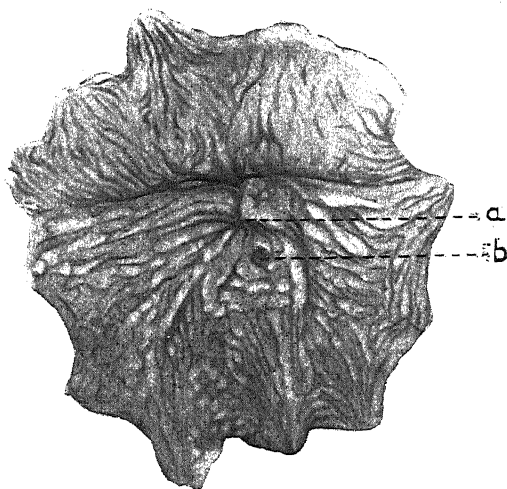


FIG. B.—Small ulcer about 1 cm. in diameter around the suture ; (a) locates the puckering of the healed mucosa ; (b) is the ulcer, near the centre of which is the suture.

Redrawn from the 'Journal of the American Medical Association.'

STRIÆ ATROPHICÆ.*E. Graham Little, M.D., F.R.C.P.*

Laming Evans¹ reports a remarkable case of this curious affection, occurring in a soldier while under observation in a London hospital, to which he had been admitted for a wound of the left chest. This made good progress, and he was allowed up. Five days later he complained of headache, had a temperature of 100°, and returned to bed. Within a few days an acute development of linear atrophic patches was noted, their occurrence being restricted to two or three days, after which no more came. Headache persisted for a fortnight, with temperatures between normal and 101.2°. There was pain in the site of the atrophy, which in early stages was pink from the distribution of fine vessels over it. The striæ ran mostly in a horizontal direction on the back of the right side of the lower thorax and lumbar region, and to the left of the mid-line of the lumbosacral region. In the discussion on this case, which was shown at the Royal Society of Medicine, several members related instances of acute linear atrophy after fevers, especially typhoid and pneumonia, and one instance was quoted as having happened in association with malignant cachexia, and one immediately succeeding an attack of mumps. Cases of this causation are to be distinguished from those atrophies of the skin due to overdistention, as in sudden loss of flesh after obesity and in pregnancy.

REFERENCE.—¹*Brit. Jour. Derm.* 1915, 281.

SYPHILIS. (*See also SYPHILIS, CEREBROSPINAL.*) *C. F. Marshall, M.D.*

DIAGNOSIS.—Craig¹ reports on the results and interpretation of the Wassermann test, based on 18,000 cases personally performed. He employed a human hæmolytic serum instead of the sheep serum, an alcoholic extract of foetal syphilitic liver as antigen, and latterly also a cholesterolized alcoholic extract of normal human heart, each specimen being tested, if possible, with both antigens. The cholesterolized extract was found as valuable as the extract of foetal syphilitic liver. The author points out that the test is essentially quantitative, and that many positive results reported in non-syphilitic cases were due to bad technique or wrong interpretation. In his own series there were only 11 positive reactions out of 2,643 non-syphilitic cases, or a little over 0.4 per cent. These cases included four of malaria, in which the reaction became negative after the fever subsided; three cases diagnosed as tuberculosis, and three as pityriasis rosea. In the latter cases hæmolysis was not completely inhibited, and all three cases diagnosed as tuberculosis recovered under antisymphilitic treatment. The only diseases, other than syphilis, which give a regular positive result are malaria, yaws, relapsing fever, and leprosy. The percentages of positive results obtained in syphilis were as follows: Primary syphilis 89, secondary 96, tertiary 87, latent 67, congenital 82, parasyphilis 68. The author's figure for primary syphilis is thus higher than that of other observers, and he found that 34 per cent gave a positive reaction by the end of the first

week of the chancre, over 57 per cent by the end of the second, 67 per cent by the end of the third, 76 per cent by the end of the fourth, and 80 per cent by the end of the fifth week. A single negative reaction during the first three weeks is no proof that the lesion is not syphilitic; the test should be repeated at intervals. Several factors influence the result of the test, the chief ones being variation in the amount of complement-binding substances in the patient's blood, the ingestion of alcohol, the growth of various bacteria in the serum, and the amount of serum used. In the interpretation of the test it is necessary to understand the terms used by the serologist to indicate complete inhibition of hæmolysis, incomplete inhibition, and complete hæmolysis, as the terms used differ in different laboratories. *As a general rule the diagnosis of syphilis should never be made on the Wassermann test alone unless there is absolute inhibition of hæmolysis.* But if the other diseases which may give a positive reaction can be excluded, the author regards absolute inhibition of hæmolysis as specific for syphilis, whether symptoms or history are present or not. He also regards a positive reaction as indicating the presence of living spirochætes, and not merely an evidence of past syphilis.

In applying the test to the *cerebrospinal fluid*, it has been shown that this may give a positive reaction when the blood serum gives a negative one. Formerly it was believed that if the cerebrospinal fluid gave a negative reaction and the blood serum a positive one, and symptoms of disease of the central nervous system were present, this distinguished cerebrospinal syphilis from general paralysis, in which both blood serum and cerebrospinal fluid give a positive reaction. The author states, however, that the negative result with the cerebrospinal fluid depended entirely on the amount tested, and that if the maximum amount allowable with the particular method in use be tested, a positive result is obtained in practically 100 per cent of cases of cerebrospinal syphilis. Therefore the test must be used with caution in differentiating between general paralysis and cerebrospinal syphilis. In general paralysis the test is positive in practically all cases in both blood and cerebrospinal fluid, while in cerebrospinal syphilis, unless the maximum amount of fluid be tested, at least 50 per cent of the cases will react negatively with the cerebrospinal fluid, and only about 30 per cent show a positive reaction in the blood. In the method employed by the author, practically 100 per cent of cases of general paralysis gave a positive reaction when 0.08 c.c. of cerebrospinal fluid were tested, while only about 20 per cent of the cases of cerebrospinal syphilis reacted positively with this amount. With larger amounts the percentage increased, until when 0.15 c.c. of the fluid was tested all the cases gave a positive reaction. Hence the titration of the cerebrospinal fluid is of great importance in differentiating between general paralysis and cerebrospinal syphilis, and in most cases a positive reaction with a small amount of fluid points to general paralysis.

In tabes the blood gives a positive reaction in 60 to 70 per cent of

cases; the cerebrospinal fluid a positive reaction in practically all cases if more than 0.15 c.c. is used, but only in 5 to 10 per cent if the amount is less than 0.08 c.c. However, even when the smallest amounts of cerebrospinal fluid are tested, cases of all three conditions sometimes give atypical results, so that the Wassermann test should not be entirely depended on in differentiating between general paralysis, tabes and cerebrospinal syphilis. While the test is of great value in distinguishing between syphilitic and non-syphilitic conditions of the central nervous system, it is of far less value in differentiating between syphilitic conditions. Here the clinical symptoms are of more value than the Wassermann test.

The author considers the test of great value as a *control of treatment*, as relapses can be diagnosed and treated on the strength of a positive reaction before clinical symptoms appear. He is also in favour of a provocative injection of **Salvarsan** both for diagnosis and control of treatment. After a small dose of salvarsan a positive reaction may occur in forty-eight hours, or may be delayed for several days. Hence the blood should be tested every day for a week.

Kolmer and Schamberg² have studied the value of **Cholesterinized Alcoholic Extracts** as antigens in the Wassermann test. Their conclusions are as follows: (1) Cholesterinized alcoholic extract of normal heart is a more sensitive antigen than alcoholic extract of syphilitic liver and extract of acetone-insoluble lipoids; (2) This extract will often give a positive reaction when this is negative with other antigens. In the author's series, 20 cases known to be syphilitic gave a positive reaction with the cholesterinized extract only; (3) This extract is easily prepared and quite stable; (4) Extract of human heart is preferable to extract of the ox or guinea-pig; (5) Cholesterinized extract is the best antigen for the control of treatment, because it is the most delicate indication of spirochætal activity.

Noguchi's Cutaneous Reaction.—J. W. Squires³ points out that this reaction is intensified by specific treatment. A case of primary or secondary syphilis may react very slightly or not at all, but if mercury or salvarsan be given, the site of injection in ten to fourteen days often develops a strong positive reaction. The cutaneous reaction is not constant in primary and secondary syphilis, but is most constant in tertiary and congenital syphilis, and gives a more delicate response than the serum reaction in patients under treatment. It is important to be cautious in interpreting the reaction, for normal persons may react to a certain degree. Careful comparison should, therefore, be made with the control injection.

Landau's Colour Test.—Kolmer⁴ has tried this test in 64 cases. According to Landau, 0.1 c.c. of a 1 per cent solution of iodine in tetrachloride of carbon, added to 0.2 c.c. syphilitic serum and left for four hours at room temperature, gives a clear yellow colour, while normal serum gives a greyish colour. Kolmer concludes that the test is of no value, on account of the low percentage of positive

reactions in cases of syphilis, and the high percentage of false positive reactions with negative Wassermann.

Vedder and Borden⁵ have compared the **Luetin** and **Wassermann Reactions** as tests for syphilis in 744 discharged soldiers. They conclude that in tertiary, latent and treated cases, the luetin test is considerably more delicate in detecting syphilis than the most efficient Wassermann test.

W. J. Stone⁶ has compared the **Wassermann, Cobra Venom, and Butyric Acid Tests** in 105 cases. The cobra venom test was introduced in 1909 by Weil, who found that while normal red-cells were more or less rapidly hæmolyzed by cobra venom in dilutions of 1-20,000 to 1-40,000, syphilitic red cells were resistant to hæmolysis in the same dilutions.

The test is not strictly specific for syphilis, any more than the Wassermann test, for positive reactions have been obtained in cases of advanced carcinoma.

TREATMENT.—C. H. Byrnes⁷ has introduced a new treatment for cerebrospinal syphilis, in the form of intrathecal injections of **Mercurialized Serum**. For this purpose he uses albuminate of mercury, a preparation of mercury similar to that supposed to exist in the blood after mercurial treatment. When an inorganic salt of mercury comes into contact with protein, coagulation occurs, with the formation of albuminate of mercury. Although this albuminate was found to be not less toxic than the inorganic salts when given by intravenous injection, it is probably less irritating.

The precipitated albuminate is soluble in excess of albumin, so that the addition of more serum forms a clear solution. It was determined that approximately 0.02 gram ($\frac{1}{50}$ grain) of mercuric chloride in solution added to 2 c.c. of serum causes complete precipitation, and that 4 c.c. of serum are required to dissolve the precipitate. Hence 6 c.c. holds 0.02 gram ($\frac{1}{50}$ grain) of mercuric chloride associated with albuminate in solution, a larger quantity than that required for therapeutic purposes. Byrnes found that 0.0013 gram ($\frac{1}{500}$ grain) or even 0.0026 gram ($\frac{1}{50}$ grain) could be given safely.

Byrnes has tried this method in 32 cases, comprising 13 of tabes, 14 of general paralysis, 2 of tubo-paralysis, and 3 of cerebrospinal syphilitic meningitis. In tabes there was relief of pain and improvement in gait, gastric and bladder symptoms. One case of tubo-paralysis with mental symptoms improved remarkably, the grandiose ideas disappearing. Some cases of general paralysis also improved. The diminution in the cell elements of the cerebrospinal fluid was more rapid than after treatment by salvarsanized serum, and Byrnes concluded that the mercurial serum forms the best treatment for cerebrospinal syphilis. (*See also the following Article.*)

L. Thompson⁸ has tried intravenous injections of this mercurial serum in cases of ordinary syphilis. The initial dose given corresponded to $\frac{1}{12}$ gr. of mercuric chloride, and this was increased to $\frac{1}{5}$ gr. Favourable results were obtained in cases of ulcerating gummata and papular

syphilides. Thompson regards the method useful when a rapid result is required. It is not necessary to use an autogenous serum. Blood may be collected from any individual, and the mercurial serum kept in sealed ampoules.

Substitutes for Salvarsan.—Since the supply of salvarsan began to run short owing to the war, several substitutes have been made by English and French chemists. The value of these substitutes has yet to be proved. Lane⁹ reports two cases of severe desquamative dermatitis and conjunctivitis following injection of 'novarsenobenzol,' a French preparation, said to be identical with neosalvarsan, and 'kharsivan,' made by Burroughs, Wellcome & Co., and said to be identical with salvarsan. The toxic effects of arsenic appear to be more severe with the new preparations.

E. G. French and C. H. Mills¹⁰ report good results with **Hectine** in an intractable case of tertiary syphilis of the palate and nasal fossae, with considerable necrosis. Before hectine was resorted to, the patient had received treatment by intravenous injections of neo-salvarsan and intramuscular injections of mercurial cream; also a course of iodide of potassium with mercurial inunction, and an injection of salvarsan: all with no effect. During two courses of hectine, comprising ten injections of 0.2 gram, the first subcutaneous, the second intramuscular, the patient gained two and a half stone in weight, and the cavity left by necrosis of the bones of the nasal fossae began to granulate. The authors, therefore, conclude that hectine may succeed when other intensive forms of treatment fail.

Staff-Surgeon Dudgeon,¹¹ writing on *Syphilis in the Navy*, points out that in the period between 1905 and 1913, while the number of cases of syphilis in the Navy diminished, the number of days lost to the service by the invaliding has shown little diminution, even since salvarsan was introduced in 1911. The diminution in the number of cases he attributes to increased sobriety and improved moral tone, and also to **Mercurial Cream** injections. The lack of decrease in the number of days of invaliding he attributes to defective diagnosis in the primary stage, statistics showing that only one case in five is diagnosed before reaching the secondary stage. Cases diagnosed in the primary stage are more rapidly influenced by treatment, and hence less time is lost. The chief explanations of this deficiency in diagnosis, he says, are, first, the application of lotio nigra or some other antiseptic to the sore before it is diagnosed microscopically; and secondly, too much reliance on the Wassermann reaction, it apparently not being generally known that this reaction takes some time to develop. Thus many cases are wrongly diagnosed at first, and then not admitted till the secondary stage. Hence the rule that no antiseptic must be applied till the primary sore has been diagnosed microscopically, either by dark-ground illumination, Burri's Chinese ink, or staining. When diagnosed, the chancre is treated locally, either by **Lotio Nigra**, **Calomel** ointment, or spraying with **Perchloride** or **Biniiodide of Mercury**. General treatment comprises three intravenous

injections of **Neosalvarsan** in conjunction with 2 gr. of **Hydrarg. c. Creta** thrice daily, followed by injections of **Mercurial Cream**.

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SYPHILIS, CEREBROSPINAL. (See also GENERAL PARALYSIS; MENTAL DISEASES.)

J. Ramsay Hunt, M.D.

The discoveries of Schaudinn, Wassermann, Ehrlich, and Noguchi have opened up a vast field of possibilities in the diagnosis and treatment of syphilis which is still in the stage of exploration and development. More particularly is this true of syphilis of the central nervous system and its treatment. Since we have at last proof that the parasyphilis of Fournier is a true parenchymatous syphilis due to the activities of the *Spirochæta pallida*, the hope has been awakened of devising some method of attack which may successfully combat this dread disease.

The diagnosis and treatment of parenchymatous syphilis was the subject of an inaugural address by F. W. Mott,¹ in which the recent developments in this field are presented in a brief, critical form, and illustrated by many interesting and important personal observations and experiments. He has examined a series of 100 brains of patients who during life presented the clinical symptoms and signs of general paralysis, and in 66 per cent of the cases spirochætes were demonstrated by dark-ground illumination, confirmed by staining films. He has not found the spirochætes once in brains of patients dying with other forms of insanity. He mentions that Foerster and Tomaszewski found spirochætes 27 times in 61 cases examined by Neisser-Pollak puncture. It is remarkable that, in spite of the fact that the brain harbours the spirochætes in all cases of general paralysis, the lymph-glands in the neck are apparently not affected; the only tissue that shows a fairly frequent definite syphilitic lesion is the aorta, and here definite nodular fibrosis was found to occur in 40 per cent of 400 male paralytics; this lesion of the aorta occurs quite as frequently in tabes dorsalis, and possibly this may be a source of infection of the perivascular lymph-channels of the posterior columns of the spinal medulla in tabes.

The congestive seizures of paresis, according to his experience, are especially associated with microscopic appearances of acute congestive stasis of the vessels, which may in early cases be more or less localized. It is probable that the multiplication of the spirochætes is associated with the escape into the cerebrospinal fluid of lipolytic and proteolytic toxins, and therefore they can act at a distance from their seat of production, and so cause, independently of serious active congestive stasis, a progressive widespread decay and destruction of the cortical neurones, such as occurs in the slow dementing forms. The signs of cortical irritation manifested by convulsive seizures, and

mental excitement manifested by expansive delirium, are probably indicative of active spirochætal development, causing a congestive stasis and liberation of toxins. The spirochætes may undergo an active development in one hemisphere and cause unilateral convulsions. The irritative process is followed by decay and destruction of the cortical neurones of one or both hemispheres, according to the colonization of the spirochætes in one or both hemispheres. This accounts for the fact that usually one hemisphere is more wasted than the other when examined post mortem.

The constant existence of the Wassermann reaction in the cerebrospinal fluid may be regarded as evidence of the presence of spirochætal toxins; and it may be assumed that the granular appearance of the ependyma of the fourth ventricle, the most characteristic naked-eye appearance met with in this disease, is probably in some way connected with a prolonged chronic irritation and proliferation of the ependyma cells, due to the action of the toxin contained in the fluid of this region. In the Oliver-Sharpey Lectures, Mott pointed out the fact that the cerebrospinal fluid contained no protein or leucocytes, and therefore invading protozoa, for example, trypanosomes or microbes, owing to the absence of the natural defences of the blood, found there a safe retreat, and were with great difficulty eliminated by treatment, because mercury, arsenic, and antimony, as well as other germicides, do not pass through the choroid plexus into the cerebrospinal fluid.

Whereas before the introduction of the Wassermann reaction post-mortem records show correct diagnosis of general paralysis in only 75 per cent of the cases, by the aid of the reaction it is rare to find an error of diagnosis in respect to this disease when, in combination with the history and the clinical signs and symptoms, the fluid has been examined. The strength of the reaction is an important means of determining whether there is an active spirochætosis. Thus, in nearly all cases of general paralysis the reaction is obtainable in all dilutions. The Wassermann test on the serum of 300 cases of general paralysis showed incidence of positive reactions of 98 to 99 per cent. The reaction is generally markedly positive, but a number of cases give slight or moderate reactions. He concludes that a positive Wassermann reaction with the serum is almost a constant feature in general paralysis, provided that the technique is reliable and adequate maximum amounts of serum (0.2 to 0.5 c.c.) are used.

Mott's experience as regards more recent developments in treatment has not been sufficient to speak of at any length, but from the literature, and from the evidence he has heard at the Royal Commission, together with his laboratory experience, he has come to the conclusion that these late degenerative forms of syphilis of the nervous system (especially with reference to general paralysis) have not been cured or even greatly benefited by any treatment with salvarsan or neosalvarsan, whether administered intravenously or intrathecally.

Some of the cases of general paralysis which have died, and in which the brain had been examined for spirochaetes, had been treated by salvarsan prior to admission to the asylum, and in one case very large doses were employed, and yet he found more spirochaetes in that case than any other. Candidly, he does not think any measure of success has attended any of the methods of treatment so far employed for general paralysis, and he believes that we must rather look to the prevention of the spread of syphilis and its early diagnosis and treatment by modern methods as the most hopeful way of combating this terrible malady.

Wile and Stokes's² investigations are of importance as indicating involvement of the nervous system during the primary stage of the disease. Careful studies were made of the cerebrospinal fluid, which were reinforced by special neurological, otological, and ophthalmological examinations. Six primary cases, presenting no evidences of generalization, were examined by these methods, and none could be rated as entirely normal in all particulars. They are inclined to the belief that actual involvement of the cerebrospinal axis may be present without any of the changes in the spinal fluid so generally accepted as criteria of central nervous involvement. These changes, however, are probably slight, and for the most part transitory, similar to the roseola which occurs on the skin. They may, and not infrequently do, precede the secondary skin and mucous membrane eruptions. It is generally accepted that involvement of the meninges is paralleled by a pleocytosis in the spinal fluid. The cases, then, in which there is central nervous involvement without obvious changes in the cerebrospinal fluid are probably in the nature of involvement of the nerve tissue itself, rather than of the meninges. A slight change in the cerebrospinal axis may be sufficient to give rise to clinical evidence of involvement, and yet such change may be insufficient to cause, at the time of puncture, a definite change in the cerebrospinal fluid. Obviously, a negative test in the cerebrospinal fluid is therefore only of value in negating the presence of involvement, in the entire absence of clinical symptoms as determined by careful examination of the nervous system itself.

In a later communication Wile and Stokes³ present further studies on the spinal fluid in cases of early syphilis, and emphasize the importance of lumbar puncture as a routine measure, supplemented by neurological, ophthalmological, and otological examinations. Even when the spinal fluid is negative, there may be subjective and objective evidences of neural involvement. The importance of these cases in the later development of paresis, tabes, and cerebrospinal syphilis is indicated. Of 26 cases, 19 showed some positive findings in the cerebrospinal fluid. Of the remaining cases, only 1 was entirely negative as regards the other elements of the examination. They, however, include such symptoms as exaggerated knee-jerks and slight decrease of bone-conduction with normal hearing as positive signs.

Wilcutt⁴ has investigated the *acoustic nerve* in the early stages of syphilis. On the basis of examinations in 293 cases in Urbantschitsch's clinic in Vienna, he concludes that the auditory symptoms after the use of salvarsan are syphilitic in nature; i.e., true nerve relapses (*neuro-récidives*), and not arsenical in origin, the result of a neurotropic action of salvarsan. He agrees with other observers that anti-syphilitic treatment—**Salvarsan** and **Mercury** combined—should be continued to combat this complication. He lays great stress on the almost constant shortening of the bone-conduction, as a sign of great value in early syphilis, which was first described by Wanner. He assumes that in the early stage there is a development of an endotoxin, which is especially liable to injure certain of the cranial nerves or their terminations, viz., the acoustic, optic, and facial nerves. With the formation of antibodies the influence of these toxins may be neutralized; hence their early appearance and often transitory nature. Ellis and Swift⁵ emphasize the importance of auditory symptoms in syphilis, the '*neuro-récidives*' or nerve-relapses affecting the eighth nerve. This complication is especially common in the secondary stage, especially if the treatment has been insufficient. They hold with Benario, Gennerich, and many others, that the nerve-relapses are syphilitic, not arsenical, and are to be taken as indications of involvement of the central nervous system and treated accordingly.

The question of *familial syphilitic infection in paresis* has been investigated by R. H. Haskell.⁶ In the families of 53 parietic patients there is a total of at least 21 mates infected with syphilis. Separating this group into the two sexes, he finds that in 49 cases in which the husband is parietic, 17 wives are infected with syphilis; in 6 cases in which the patient is a woman, there are 4 husbands who are known to have syphilis. While these figures are high, they are not greatly higher than other investigators have found, and, as already suggested, probably underestimate rather than exaggerate the real situation. In a study of 54 cases of married parietics, Plaut and Göring found the other mate showing a positive Wassermann reaction in 32.6 per cent, a slightly smaller number than the figures of 38.18 per cent.

The question of sterility, and the number of abortions and living-born children, in 86 cases in which the accuracy of the anamnesis could be definitely depended on, were also investigated. The conditions found are clearly illustrated in the accompanying table:—

DATA CONCERNING FERTILITY IN PARETIC MARRIAGES.

	Total-No.	Sterile Completely	Abortious only	Total No. of Abortions	Living Born Children
Male, G.P. . .	76	22	10	43	110
Female, G.P. .	10	6	1	1	13
Total . .	86	28	11	44	123

From this study the following conclusions were drawn: The large number of 38.18 per cent of conjugal mates of parietic patients is shown to be infected with syphilis. In most of these mates the condition courses unrecognized as *lues latens*. A pitifully small number of them ever receive treatment. The proportion of these infected mates who develop paresis later appears to be higher than those who receive their infection from non-metasyphilitic sources. The number of completely sterile marriages in syphilitic families in which one individual later develops paresis is abnormally high, constituting 32.5 per cent. This percentage is higher when it is the female mate that later becomes a parietic. The number of marriages in which repeated pregnancies result only in abortions is likewise abnormally high, constituting in this series 12.7 per cent. Of this series of 86 marriages, 45.3 per cent were absolutely childless. Among 167 pregnancies, there were 42 abortions, miscarriages, and still-births. Among 123 living-born children, 20 had already died before their eleventh year. The number of living children per family is abnormally small. A large number, in some investigations reaching as high as 25 per cent, of these children are actively syphilitic. An equally large additional number show signs of degenerative physical conformation and psychopathic tendencies, without a positive Wassermann reaction.

Leonard Findlay⁷ obtained a positive Wassermann reaction in 59 per cent of 15 *mentally defective children*. Many of these presented none of the usual stigmata of congenital syphilis, and some were benefited by salvarsan intravenously. He therefore concludes that syphilis is a frequent cause of idiocy; that in syphilitic idiocy there may be no luetic stigmata; and that **Neosalvarsan** introduced intravenously or intramuscularly has a very marked effect in improving the mental condition.

Intraspinal Therapy of Syphilis of the Central Nervous System.—Since the contributions of Swift and Ellis, Marinesco, and Robertson, the intraspinal therapy of syphilis of the central nervous system has been the subject of many investigations and much controversy. The basic idea which underlies this method of treatment was such as to appeal to all students of this subject, viz., that in intractable forms of syphilis of the brain and cord, especially parenchymatous types such as paresis and tabes, the infective agent was so securely entrenched as to be inaccessible to remedies like arsenic and mercury introduced into the general circulation, because of the impermeability of the choroid plexus. It was thought that such collections of spirochaetes might be reached through the cerebrospinal fluid and the lymph spaces of the brain and cord. In this way the disease would be subjected to a combined attack, through the blood and cerebrospinal circulation. Swift⁸ reviews the present status of this question. He believes that while all the types are due to the activity of the *Spirochaeta pallida*, the amount and kind of treatment are largely determined by the localization of the lesion, whether in the cortex,

cord, meninges, or blood-vessels, by the difference in the nature of the response of the various tissues, and by the stage of the disease.

The whole subject of subarachnoid therapy may be summarized as follows :—

I. Substances injected :

1. Neosalvarsan dissolved in water, normal saline, or cerebrospinal fluid.
2. Serum—salvarsanized in vivo—
 - a. Human serum.
 - b. Serum of animals.
3. Serum salvarsanized in vitro—
 - a. With salvarsan.
 - b. With neosalvarsan.
4. Mercury—
 - a. Mercuric chloride lavage of subarachnoid space.
 - b. Mercuric cyanide dissolved in saline.
 - c. Mercurialized serum.

II. Mode of application :

1. Into spinal subarachnoid space by lumbar puncture.
2. Into cranial subarachnoid space through trephine opening—
 - a. Subdurally.
 - b. Into third ventricle.
3. Into large basal subarachnoid cistern through sphenoidal fissure.

Swift holds with many others the opinion that the direct intraspinal injection of neosalvarsan is a precarious and often dangerous procedure. The reaction following the injections consists, in the milder cases, of various degrees of urinary retention and incontinence, rectal paralysis, paræsthesias and numbness of buttocks and legs, ataxia in legs, girdle pains, and occasionally trophic ulcers ; in the more severe cases, of complete paralysis of the lower part of the body, and death from infection of the urinary tract. Unfortunately, a given dose may be well tolerated several times, but later be followed by severe symptoms ; other patients suffer from their first injection, and some completely escape injury. Because of the uncertainty of the sequelæ, the injections should be given with extreme caution, if at all, and the dose should never exceed 0.5 mgm.

Serum Salvarsanized in vivo is free from these objections, if obtained from the patient (autosalvarsanized). There is, however, an objection to the use of serum obtained from animals for this purpose as suggested by Marie and Levaditi, because of the danger following repeated injections of a foreign protein. Human serum salvarsanized in vitro by a method of Ogilvie he recommends, and states that the spirochætidal effect of such serum was found to be superior to serum obtained from patients after salvarsan intravenously. Evidently Ogilvie's modification is an advance in the preparation of serum for intraspinal injection.

The use of **Mercurialized Serum** (Byrnes) is also favourably considered. Perhaps alternate injections of mercurialized and salvarsanized serum combined with vigorous general therapy will give better results than any of the methods so far applied.

The favourable action of intraspinal injections of salvarsanized serum may be due to several factors, viz. (1) The serum is spirochæticidal; (2) It may contain syphilitic antibodies; (3) The local irritation may increase the permeability of the meninges; (4) The acute irritation produced by the serum may exert a beneficial effect on the chronic inflammatory process; (5) The normal serum may contain substances which, when brought into contact with the syphilitic exudate, cause it to resolve.

His general conclusion is that intraspinal injection of 'autosalvarsanized serum,' or serum to which a small amount of salvarsan or mercury is added, is of distinct help in certain cases of tabes and cerebrospinal syphilis. Not all patients with these diseases require intraspinal treatment. Many of them respond well to intravenous injections of salvarsan combined with mercury and iodides properly administered. In other cases, the symptoms and abnormal cerebrospinal fluids are not controlled by general therapy, and it is in this class that he believes the addition of intraspinal therapy to be of value. Both the clinical side and laboratory evidences of active disease should be considered, and treatment controlled by repeated examinations of the blood and cerebrospinal fluid. Although the treatment of these diseases should be systematic, it should not be so rigid that individual indications should be disregarded. Not infrequently one sees improvement only after active measures have been discontinued. Others seem to require constant treatment until all evidences of active disease have disappeared. Only by considering all these factors can consistent beneficial results be obtained.

Riggs⁹ has administered over 200 injections of salvarsanized serum in cases of tabes, paresis, and cerebrospinal syphilis (the Swift and Ellis procedure). There have been no ill-effects, aside from one case of aseptic chemical meningitis in which there was speedy recovery. Remissions occurred in 3 out of 8 paretics; 1 patient relapsed after four months; the other 2 apparently are perfectly normal. The blood-serum and cytochemical reactions were practically normal; the spinal fluid only remained mildly positive. In 75 per cent of the tabetics the spinal fluid has become negative, and all but 2 out of 22 cases have been bettered clinically. The gait has improved, the lightning pains have lessened or disappeared, the bladder symptoms have cleared up, while at the same time there has been a decided change physically for the better. All of the cases of cerebrospinal syphilis have improved clinically, cytochemically, and biologically, with one exception in which treatment seemed to have no beneficial effects.

C. F. Reed¹⁰ reports 20 cases of paresis which have been treated with 123 intralumbar injections of neosalvarsan, in doses ranging

from 0.003 to 0.006 gram diluted in at least 10 c.c. of the patient's own spinal fluid. During the treatment 3 patients died, but of these, 2 were in the final stages, and death cannot be fairly attributed to treatment. One case, already slightly spastic when received, became intensely spastic and died with symptoms of motor-tract degeneration. Two suffered from incontinence.

A few complained of weakness, headache, and leg pains from time to time after treatment; a number had a slight rise in temperature for a short time afterwards. One case developed Charcot joint during treatment. One patient had convulsions subsequently, but has had others not connected with treatment. One case has entered a fair remission, but still shows positive fluid findings. Another is improved markedly, but is still very evidently parietic. A number show improved conduct or physical health, which may possibly be the result of hospital care. From the foregoing he concludes that intralumbar treatment with neosalvarsan in small quantities is without effect, and that when pushed with the object of obtaining results, it is extremely apt to prove injurious. Its use in this manner is to be discouraged.

Favourable results with the Swift-Ellis method are reported by Hammes¹¹ in both tabes and paresis, particularly the former.

Of 11 patients treated by Pilsbury,¹² 6 showed improvement in some respect, not necessarily clinical, 1 is no better, and 4 are dead. He states, however, that in this series the disease in nearly all was well advanced. In most of the cases the tendency has been towards a reduction in the amount of globulin and of albumin, in the number of cells, and in the spinal fluid Wassermann.

C. W. McClure¹³ has also tried the Swift-Ellis treatment, and summarizes his experiences as follows: The results in cerebrospinal lues and tabes in the small series of cases studied, and those collected from the literature, are encouraging, not only as regards cessation of symptoms, but also in the laboratory findings in the cerebrospinal fluids. The results in paresis are either discouraging or problematical. The most marked improvement has occurred in the laboratory findings, and in these there has been a relapse in those cases followed for several months. The improvement in mentality so far recorded may be but the result of remissions to which the disease is prone, even in the absence of treatment; but the fact that improvement may occur, even if only apparent, warrants its use in a disease otherwise hopeless.

A. J. Crowell and J. P. Munroe¹⁴ note an improvement in the pathology of the cerebrospinal fluid after intraspinal injections. Favourable results from the use of this method are also reported by Rytina and Judd.¹⁵ Johnson, Breaks, and Knoefel¹⁶ report improvement in two cases of tabetic optic atrophy, using the Swift-Ellis treatment.

Sachs, Strauss, and Kaliski¹⁷ review their experiences with the modern methods of treatment of syphilis of the nervous system.

They believe that while salvarsan represents a great advance therapeutically in the treatment of syphilis, its intraspinal use is attended by so much danger and uncertainty that they have practically abandoned it. The use of salvarsanized serum they regard as a superfluous procedure, and believe that any advantages which appear to follow this method really result from the preliminary intravenous injection.

It would seem to be proved that since the blood-serum, which is about one-third the whole blood-volume, contains only an infinitesimal trace of arsenic after an intravenous injection of the drug, that the serum as diluted (40 to 50 per cent) for intraspinal administration is not truly salvarsanized, and contains no more arsenic than does the cerebrospinal fluid after simple intravenous injection.

Salvarsanized Serum of Standard Strength.—H. S. Ogilvie¹⁸ describes a method of treating human serum in vitro with salvarsan, thus obtaining a standard strength. Full details of preparation are given in his paper. Marinesco and Minea¹⁹ have also utilized neosalvarsan in a similar manner.

The Intradural Administration of Mercurialized Serum.—The introduction of mercury into the subdural space is not a new procedure. Horsley, some years ago, advocated irrigation of the spinal canal with weak solutions of mercuric bichloride after laminectomy in cases of spinal syphilis, and Ravaut has reported on the intraspinal treatment with mercurial salts in small doses. C. M. Byrnes²⁰ has recently perfected a method modelled on that of Swift and Ellis, by which mercury in larger amounts may be administered intrathecally without painful or untoward consequences. The chloride in solution is added to the blood-serum obtained from the patient, and an albuminate of mercury is formed; in this form the compound is less irritating to the endothelial structures, and larger quantities may be injected without toxic symptoms. The technique is as follows: Sufficient blood is withdrawn to yield from 12 to 30 c.c. of serum. The larger amount is obtained if concentrated serum is to be used. After the blood has coagulated, the serum is pipetted and, if necessary, centrifugalized for twenty minutes. If diluted serum is used, to 12 c.c. of the centrifugalized specimen is added 1 c.c. of a solution of mercuric chloride in freshly distilled water, so made that each cubic centimetre contains 0.0013 gram ($\frac{1}{80}$ grain) of mercuric chloride. To the serum thus prepared is added sufficient quantity of normal salt solution to make a total volume of 30 c.c. If the concentrated serum is used, this step is omitted. It is heated at 56° C. (132.8° F.) for half an hour, and administered, by gravity, at body temperature. Since the desired amount of mercury is readily soluble in the diluted serum, there is no special reason for employing the concentrated preparation. The reaction following the administration of mercurialized serum is usually mild. There is some pain in the legs for six or twelve hours, slight nausea, rarely vomiting, and a moderate rise of temperature. These symptoms generally subside within

thirty-six hours. The sphincter disturbances sometimes seen after the use of salvarsanized serum, renal disturbance, or other untoward symptoms have not been observed. The improvement in clinical symptoms has been similar to that observed in the Swift-Ellis method. In most instances of locomotor ataxia, there has been decided relief of the pains, the gait has improved, and gastric symptoms have been distinctly alleviated; in others, there has been little or no change in the clinical condition.

Reasons given for mistrusting the value of **Mercury Salicylate** injections (*p.* 22); action of **Salvarsan** on blood-pressure (*p.* 28).

REFERENCES.—¹*Brit. Med. Jour.* 1915, i, 192; ²*Jour. Amer. Med. Assoc.* 1915, i, 979; ³*Ibid.* 1465; ⁴*Ibid.* ii, 602; ⁵*Ibid.* i, 1471; ⁶*Ibid.* 890; ⁷*Glasgow Med. Jour.* 1914, ii, 241; ⁸*Jour. Amer. Med. Assoc.* 1915, ii, 209; ⁹*Ibid.* 840; ¹⁰*N. Y. Med. Jour.* 1915, ii, 561; ¹¹*Jour. Amer. Med. Assoc.* 1914, ii, 1277; ¹²*Ibid.* 1274; ¹³*Boston Med. and Surg. Jour.* 1914, ii, 520; ¹⁴*Med. Rec.* 1914, ii, 543; ¹⁵*Amer. Jour. Med. Sci.* 1915, i, 247; ¹⁶*Jour. Amer. Med. Assoc.* 1914, ii, 866; ¹⁷*Amer. Jour. Med. Sci.* 1914, ii, 693; ¹⁸*Jour. Amer. Med. Assoc.* 1914, ii, 1936, and *Med. Rec.* 1915, i, 1062; ¹⁹*Bull. de l'Acad. de Méd.* 1914, 259; ²⁰*Jour. Amer. Med. Assoc.* 1914, ii, 2182.

SYPHILIS, CONGENITAL. *Frederick Langmead, M.D., F.R.C.P.*

ETIOLOGY.—*The Influence of Heredity.*—Since the advances in our knowledge of immunity and the introduction of the Wassermann test, many attempts have been made to place upon a scientific basis the laws of transmission arrived at by clinical experience and hitherto obscure in their nature. W. P. Boardman¹ discusses at some length the subject of maternal and paternal heredity. To the law established by Colles in 1837, many exceptions, he says, have been published, but according to Bobrié, most of these have been based on a faulty or insufficiently prolonged observation, and Trinchese has shown that the mothers of syphilitic infants are not infected with syphilis subsequently, but are really suffering from late syphilis. It may be accepted, therefore, that the mothers of syphilitic infants are always immune to the disease, and, since the only way of becoming immune to syphilis is to suffer from the disease, it must be admitted that every one of these mothers has had syphilis. Others claim, however, that the mother's insusceptibility is due to a form of passive immunity acquired through the placenta, though she herself may not become infected; but passive immunity from any other disease lasts but a short time, whilst in this instance it is permanent. Some hold that the mother must become infected because her circulation is so intimately related to that of the child, and by this imply that the child is infected by the father, and the mother by the child. In support of such a possibility is the absence of any apparent primary sore in the mother in many instances; but Gaucher has shown that the number of women recently infected and who reveal a chancre or the remains of it is only 37 per cent, and the occurrence of a primary lesion in syphilitic pregnant women is practically the same (33 per cent). We must suppose, therefore, that as in non-pregnant women, its apparent absence is due to the difficulty in detecting it. Hence, on clinical

grounds, there is no reason to suppose that the foetus infects the mother.

He next considers the part played by the father in infecting the child. Since there are many examples of pure spermatie infection, *Spirochaeta pallida* must be present in the fluid. This does not mean, however, that they are within the spermatozoa, which would be a physical impossibility. Again, it is difficult to believe that the ovum becomes infected, for on the one hand it would be too disturbed to develop properly, and on the other, the spirochaete would not survive long, since it needs for its existence differential cells not to be found in the ovum. From a biological standpoint, therefore, infection of the ovum is an absolute impossibility. After conception the cervical canal is closed by membranes, and infection of the foetus by semen is consequently impossible also.

The Wassermann reaction throws additional light on this important subject. A positive reaction is obtained in a large proportion of women who have borne syphilitic children. Although the statistics of different observers vary widely, the average percentage reactions is from 75 to 85, and it has been shown to be much higher if those mothers only are included who have given birth to syphilitic children within a short time before the test is made. Many of the mothers whose blood gives a positive result show no other evidence of the disease; but, on the other hand, many of those on whom the test is negative are undoubtedly syphilitic—an indication that the incidence of syphilis among the mothers is much higher than the statistics suggest. Moreover, even when the reaction is negative, spirochaetes are often found in the foetal cord and in the placenta, positions in which it is hardly conceivable that they could be present without infecting the mother. The conclusions arrived at by these considerations is the same as that derived from clinical evidence, viz., that the mother is practically always syphilitic, and that there is no such thing as paternal transmission of the disease to the child.

This conception of the transmission of syphilis bears upon the important question. When is it permissible for syphilitics to marry? Boardman considers that a man must follow treatment for at least two or three years, and wait for a year after the last symptom of the disease. If there has been a disposition for mucous patches to recur, he advises that a longer period should elapse. On the other hand, after waiting this time, a positive Wassermann reaction or tertiary manifestations should not be considered as contra-indications to marriage. Such a patient need have no fear of infecting his wife in Boardman's opinion, for although spirochaetes have been demonstrated in tertiary lesions, they have never been known to transmit the disease under clinical conditions. If he cannot infect his wife, he runs no risk of having a syphilitic child. In the case of a woman, he advises waiting until there has been a negative reaction for a year and a half or two years after all symptoms have disappeared and treatment has been stopped.

Syphilis and Death of the Fœtus.—The following observations bearing on this important point are quoted by Boardman. Marcus found it to be the cause of 18·2 per cent of a series of 116 still-births and abortions. On the other hand, abortion during the first months of pregnancy would appear to be a quite uncommon result, for Reischig records that it occurred in only 0·78 per cent of 500 pregnant syphilitic women; and Weber met with it only once among 35 such women. Trinchese holds the same view, and came to the conclusion, after a review of the literature and considerable personal observation, that when abortion occurs in the case of syphilitic women, some other condition, and not syphilis itself, is the cause. In only two cases of abortion has Boardman found a positive Wassermann reaction or clinical signs of syphilis. From the fourth to the seventh month of pregnancy, however, the birth of dead fœtuses is frequently due to syphilis, 35 to 40 per cent of such births being thus explained, the proportion being much higher towards the end of this period. Premature births, especially at about the eighth month of fetal life, are frequently due to syphilis, about two-thirds of all syphilitic children being born at this time, only about 5·5 per cent being born at full term. Leonard Findlay and Madge E. Robertson² mention a recent analysis by Prof. Williams, of Baltimore, which indicates the importance of syphilis as a cause of still-births. Of 10,000 consecutive pregnancies in which there resulted 705 still-births, 26 per cent were due to this disease. In addition, of the children born alive, 3·5 per cent were definitely syphilitic. As Boardman says, little is known as to the time at which the fœtus becomes affected. Instances have been given where a child was born with syphilis fully developed two months after the mother was exposed to the infection, and many others where the same result has followed infection of the mother during the latter half of pregnancy. It is during this period, he thinks, that most of the infection of the child takes place. This hypothesis is supported by the curve of incidence of the birth of syphilitic children. He suggests also that infection is more and more prone to occur as the placenta increases in size.

Mortality of Syphilitic Infants.—According to Boardman, Engel and Reimer state that children showing symptoms in the first four weeks of life nearly all die; of those showing them in the second month, two-thirds die; and of those showing them in the third month, about half die. Only about 28 per cent of children born syphilitic survive the first year.

SYMPTOMS.—*Early.* Boardman describes the two well-known clinical pictures met with in syphilitic infants: one, that of an infant with the characteristic old-man appearance, feeble cry, wrinkled skin, and general aspect of prematurity; the other, that of an infant, healthy-looking at birth, but whose initial loss of weight during the first week is abnormally great, and who thereafter continuously loses weight and strength. If the child survive, it is usually prone to infections, especially tuberculosis, during the first year of life, for, as

Marcus has shown, only 25 per cent of the deaths of syphilitic infants within this period are ascribable to syphilis *per se*. The commonest symptom, in Boardman's experience, is 'snuffles.' He mentions also the skin lesions, the best known being pemphigus syphiliticus, the enlargement of liver and spleen, and that rarer condition, so-called pneumonia of the new-born. Referring to enlargement of lymphatic glands, he quotes McCarthy, who lays particular stress on enlargement of the epitrochlear glands as a means of diagnosis. Although often enlarged in other conditions, a morbid increase in their size during the first six months of life is very suggestive of syphilis unless there are definite lesions of the skin or hands to account for it. A common occurrence is death without apparent cause.

Later Manifestations.—Boardman deals fully with these. *Teeth.* The lower jaw is often narrowed from side to side, and protruding beyond the upper. The erosions on the permanent incisors and first molar teeth are, he thinks, quite characteristic of syphilis, whilst poorly developed crowns of the molars and canines, with a horizontal shelf below, are often seen. Microdontism, especially of the incisors, he regards as frequent. He quotes Gaucher, who considers that wide separation of the upper middle incisors is strong indication of the disease. Among the congenital syphilitic affections of the *genio-urinary organs* he includes delayed puberty and scanty growth of pubic hair, anorchism or undescended testicle, sclerosis of the testicles, albuminuria and suppression of urine, and paroxysmal hæmoglobinuria. Among fifty-nine patients suffering from the last, Browning and Watson found that the Wassermann reaction was positive in 90 per cent.

During the last year Savariaud and Addison have independently investigated the subjects of syphilitic *bone disease* in infants and children. In the well-known 'pseudo-paralysis' due to disease of the ends of the diaphyses, x rays frequently show that the disease is symmetrical or affecting all the extremities, although the symptoms may be located in one area only. Later in childhood, periostitis of the long bones or those of the face or skull may occur. This lesion is more diffuse, involving the whole of the diaphysis, and causing either general enlargement of the bone or bossing, with severe, persistent, nocturnal pain as a prominent symptom. Beginning in the hard bone, it may penetrate to the medulla or through the periosteum, and, becoming secondarily infected with pyogenic organisms, resemble an ordinary osteomyelitis. Graves has found that a 'scaphoid' scapula, a condition in which the vertebral border of that bone is concave, is present in a large number of children of syphilitic parents. It occurs in many other children, however, and Kellner noted it in 45 per cent of the feeble-minded.

In addition to the chronic bilateral, painless, symmetrical synovitis with effusion, another condition of the *joints* is noted. It affects the larger joints, including the hip, is associated with much spasm and wasting, and is not accompanied by effusion. X rays reveal a

focus at the end of the diaphysis. Its similarity to tuberculosis of the joints has led to frequent mistakes. Fournier has also described a form of chronic arthritis deformans in young subjects, due to congenital syphilis. The age of the patient, and the fact that it affects the large joints first, are the features by which it may be distinguished.

An important symptom which should suggest syphilis is severe nocturnal headache in a child, not responding to ordinary treatment. Slight spasms may accompany it, and may afterwards develop into convulsions, the child becoming a definite epileptic later.

Leonard Findlay and Madge E. Robertson² have met with twelve more cases of the condition to which the former gave the name '*eczema oris syphiliticum*' (described and illustrated in the *MEDICAL ANNUAL*, 1915).

H. F. Stoll³ has written on the relationship of congenital syphilis to *arterial disease*. He quotes Rebaudi, who found changes in the aorta similar to those observed in acquired syphilis in 13 out of 17 still-born children, and Roch and Weisner, who found similar lesions in 59 per cent. In 5 Rebaudi demonstrated the spirochætes.

TREATMENT.—As Boardman points out, the Wassermann reaction has taught us that treatment must be continued for at least three or four years, and must be very intensive if the disease is to be cured. A good deal has been accomplished by combining **Mercurial** treatment with **Salvarsan** or **Neosalvarsan**. A method commonly employed by those who use the latter drugs is to inject one or other of them into the external jugular or scalp veins two or three times, at intervals of two or three weeks. The average dose is 0.01 gram of salvarsan or 0.015 gram of neosalvarsan per kilo of body weight. This course is repeated after an interval of a few months, and a third time if necessary. This is combined with mercurial inunctions or injections, for courses lasting about two weeks, with intervening periods of rest. The soluble injections are often employed during the first three months of life, and the salicylate afterwards. **Potassium Iodide** is not well borne, and should be reserved for gummata. According to Boardman, very few unpleasant results have followed the employment of salvarsan for infants, whilst its use together with mercury, usually clears up the lesion more quickly than does mercury alone. The coryza, however, is resistant to any form of treatment, and may persist for months. The younger the child, the more promptly will efficient treatment effect a cure.

Leonard Findlay and Madge Robertson¹ record the results obtained by them from various forms of treatment.

1. *Mercurial inunction and, in the case of breast-fed children, the administration of potassium iodide and perchloride of mercury to the mother.* Of 18 cases available for publication, 6 children became well to all appearances, and 12 died.

2. *Joha and neosalvarsan by intramuscular injection, and mercurial inunctions.* Nine cases were treated in this way. Two children

who were under a year old died from bronchopneumonia six months later. In 3 cases the Wassermann became negative and remained so. These children received five to seven injections of 0.1 to 0.45 gram at weekly intervals. In 3 cases much improvement followed, but the Wassermann remained positive. This form of treatment was discarded because it caused great pain, and frequently necrosis and sloughing.

3. *Neosalvarsan by intravenous injection, and mercurial inunction.* Forty-three cases were treated in this way. In the younger children the veins of the scalp were used as the site of the injection, and concentrated solutions of the drug were employed, 0.05 to 0.2 or 0.3 gram neosalvarsan being dissolved in 3 to 5 c.c. of normal saline. Older children were injected by the external jugular vein. Twenty-two of the 43 were greatly benefited; 4 were improving under treatment, but were lost sight of; 17 died. In 1 case death could be ascribed to the injection, the other children dying from bronchopneumonia, whooping-cough, or measles, after treatment had been discontinued for a considerable time. One or two children suffered from the disease very severely, and after improving under treatment for a day or two, died, apparently as the direct result of the toxæmia engendered by the death of the spirochaetes. The injections were administered weekly, but in view of these toxæmic deaths, they advise very small doses for quite young and severely infected infants, e.g., 0.025 gram twice weekly. Twenty-two of these cases were of infants under three months old, and including all those who died within twelve months of the last injection, the mortality-rate was 45 per cent. This compared favourably with that of 71 per cent in the cases treated by mercury alone.

Seven pregnant women were treated by the intravenous injection of neosalvarsan and mercurial inunction. Concentrated solutions were used, as much as 0.6 gram and in two instances 0.9 gram of the drug being dissolved in 5 or 10 c.c. of saline. None of the babies showed evidence of syphilis. In no case was the course of the pregnancy interrupted, and the mothers seemed to suffer little from the treatment except when the larger dose of 0.9 gram was given, when headache, nausea, and vomiting followed. Such symptoms might be avoided by using small doses, 0.3 gram being probably sufficient, if repeated weekly until the Wassermann reaction becomes negative. These various results show, as the writers point out, that syphilis, even when treated vigorously shortly after birth, is very difficult to cure, and that the mortality is high. Many of its manifestations are incurable. Of the forms of treatment, ante-natal treatment with salvarsan would seem to give the best results, and this is confirmed by the work of Sauvage and of Bourret. The former reported 93 per cent and the latter 100 per cent of cures. For this reason Findlay and Robertson urge the need of making syphilis a notifiable disease.

REFERENCES.—¹*Jour. Cutan. Dis.*, 1914, 545; ²*Glasgow Med. Jour.*, 1914, ii, 401; ³*Jour. Amer. Med. Assoc.*, 1914, ii, 1558; ⁴*Glasgow Med. Jour.*, 1915, i, 330.

TABES DORSALIS. (*See* SYPHILIS, CEREBROSPINAL.)

TACHYCARDIA, PAROXYSMAL. (*Vol.* 1915, p. 602.)

TELANGIECTASIS, GENERALIZED. *E. Graham Little, M.D., F.R.C.P.*

This is a very rare condition, of obscure etiology. Stokes¹ reports a new case in which the co-existence of syphilis was probable.

The patient was a widow, age 34. The telangiectasia began at the age of 29, eight years after marriage, on the dorsum of the feet, spread from there up the legs, and from the wrists to the arms. Five years after the first appearance the whole surface of the body was involved, with the exception of the scalp, neck, shoulders, palms, and soles. The dilated vessels usually assumed arborescent or stellate forms, but angiomatous puncta, the size of a pinpoint, were found scattered over the shoulders. All the parts of the skin thus affected showed a branny desquamation. The mucous membranes remained unaffected throughout. Hæmorrhage, as tested by two biopsies performed for histological investigation, was not abnormally free. The patient's two children, both girls, aged respectively 10 and 12, showed no telangiectases.

REFERENCE.—¹*Amer. Jour. Med. Sci.* 1915, i, 669.

TEST MEALS. (*See* DYSPEPSIA ; GASTRIC ANALYSIS.)

TESTES, UNDESCENDED. *W. I. de C. Wheeler, F.R.C.S.I.*

Armstrong¹ mentions four cases of boys between the ages of thirteen and fourteen years with complete absence of both testicles from the scrotum. In each case the penis was very small and there was no appearance of hair on the pubis. Two of them had rarefaction of the outer third of the eyebrows. One was of the Mongolian type. To each case **Thyroid Extract** in $\frac{1}{2}$ -gr. doses was administered twice daily over an extended period. The effect of the treatment was immediately apparent. In a few weeks the testicles could be felt in the inguinal canal, and in three cases the complete descent had taken place in about three months.

REFERENCE.—¹*Med. Press and Circ.* 1915, ii, 106.

TESTIS, SURGERY OF. *W. I. de C. Wheeler, F.R.C.S.I.*

The mortality is admittedly high from recurrence after operations for *malignant disease of the testis*, and much has been recently done in order to carry out the operation of removal in as radical a manner as is possible. A clean dissection of all the lymphatics which drain the area and the primary glands into which these lymphatic vessels flow should be the aim of the surgeon. Recent literature gives more hope of good final results, improvements having developed along the lines of more radical operations, and in more early diagnosis. Too much stress should not be laid on a positive Wassermann reaction in cases of tumours of the testes. Primary carcinoma or sarcoma may very easily be present in patients who by coincidence react positively

to this test). The simple operation of castration should never be performed: in every case the lymphatic region should be explored.

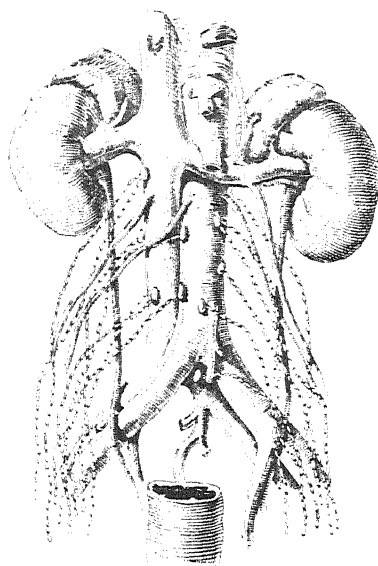


Fig. 18.—Primary lymphnodes of the testicles.
(From Spalteholz and dissections).

In this way at least a small proportion of patients will be cured by a radical operation who would otherwise have died. Hinman¹ studies the operative treatment of tumours of the testes in order to determine from an analysis of Johns Hopkins Hospital cases the true value of castration, and to compare this with the results following the radical operation. The first nodes reached by the lymph-flow from the testes are four or five, lying, for the right testis, in the loose tissues on the inferior vena cava, or sometimes between it and the aorta. On the left side there is a similar group by the side of the aorta; occasionally there is one gland at its bifurcation. The glandular zone is limited above by the renal pedicle and below by the bifurcation of the aorta. Secondary glands lie along the internal

and external iliac vessels, and deeply between the vena cava and the aorta. Operative interference is contra-indicated in every case in which the involvement of the lumbar glands can be determined clinically. Hinman concludes that about 15 to 20 per cent of teratoma testis will be cured by castration. Obviously a cure is possible only when removal is undertaken before the onset of glandular or other metastases. The cure cannot be assured until nine years after operation, although the danger of recurrence after four years is very small. In the first in-

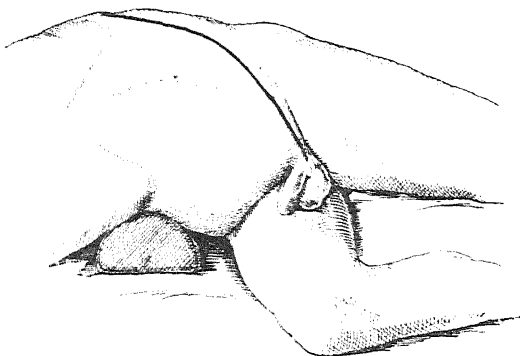


Fig. 19.—Dorsolateral position and line of incision for radical operation.

stance, cancer of the testis disseminates to the lymph-nodes already

mentioned, on the aorta for the left testis and on the vena cava for the right. Both carcinomata and mixed-celled tumours are teratomata in origin. The primary lymph-nodes are a very imperfect guard against secondary invasion, and metastases by efferent lymph channels or by blood-vessels to thoracic or abdominal organs may occur early, rendering surgical treatment useless.

The experience of various surgeons in 46 cases has demonstrated that in suitable cases the radical operation is not only feasible but technically easy, with an immediate mortality of only 11 per cent. Emphasis is laid on the fact that radical operation should never be undertaken when lumbar metastases are recognizable clinically. It has not been possible to estimate the precise success attending the radical operation. Forty-six per cent are alive: 1 for five years, 1 for four years, 5 for almost three years, 2 for over two years, and 11 for one year or less. At least 4 cases have been probably cured, where the primary glands were invaded with cancer at the time of operation. Obviously, simple castration could not have helped these patients. Figs. 48-50 indicate the extent of the required operation.

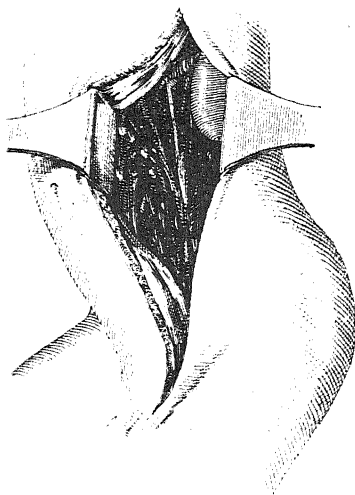


Fig. 50.—Peritoneum stripped back, showing lymph area to be removed.

REFERENCE.—¹*Jour. Amer. Med. Assoc.* 1914, ii, 2009.

TETANUS. (*Vol.* 1915, *p.* 602.)

THORAX, SURGERY OF.

W. I. de C. Wheeler, F.R.C.S.I.

Lung Abscess.—In a study of twenty-seven cases, Scudder¹ found that the largest number of lung abscesses caused by the influenza bacillus were associated with bronchopneumonia. There were several of embolic origin, several subdiaphragmatic extensions, and one case of actinomycosis. Scudder arrives at the following conclusions:—

1. The bronchiectatic process should be attacked by the surgeon while it is limited to one lobe of a lung. A very decided attempt should be made to determine as early as possible the diagnosis of bronchiectasis. Surgery may be able then, by the excision of a single lobe, to cure such a condition.

2. Actinomycosis of the lung must be recognized in its initial stage and vigorously attacked by surgery, for only in this way is there a great likelihood of curing this very fatal disease.

3. Attention is attracted to lung abscess following tonsillectomy. One case in the series followed operation upon the nasal septum. The inhalation of foreign material may have been the starting-point. The employment of intratracheal anæsthesia with gauze packing of the pharynx may be wise in these cases.

4. The surgeon should be alert to the occurrence of lung abscess associated with embolism following ordinary surgical operations. A patient suddenly suffering severe pain in the chest following surgical operation, associated with a rise in temperature and pulmonary signs, should be very carefully studied, lest such signs may mean the beginning of pulmonary abscess. Early operative interference upon the lung in such cases may not only preclude the possibility of the extension of a pulmonary lesion, but may save the life of the individual.

5. An increasing number of intra-abdominal infections are associated directly with an infection through the diaphragm of the diaphragmatic pleura, and then of the lung with pulmonary abscess. These cases of subdiaphragmatic origin must be attacked early to prevent subsequent damage intrathoracically.

6. The *x* ray is of great value in the diagnosis of lung abscess. The thorough röntgenological examination necessitates fluoroscopic observations, stereoscopic plates, and both anterior and posterior views. If there is reason to suspect fluid in the chest, the examination should be made in the upright, as well as in the horizontal position. The exact position of the heart, the position and excursion of the diaphragm, and the clearness of the costodiaphragmatic angle, are facts which help in the interpretation of the *x*-ray plates. The recognition of the presence or absence of tuberculosis, of a diffuse or bilateral bronchiectasis, of syphilis of the lung, will also assist. Centrally seated abscesses, almost impossible of determination by ordinary physical signs, may be accurately localized by the *x* ray. This is useful in the interpretation of physical signs in cases of suspected lung abscess and bronchiectasis, and may help in the exact localization of the abscess.

7. This series of 27 cases demonstrates the efficacy of surgical measures in the treatment of abscess of the lung. There were 9 deaths, 18 recoveries, and 11 cases were practically well, without cough or sputum.

Empyema.—This has engaged the attention of many writers, and much difference of opinion exists as to the prognosis and treatment of the various types. Wilensky² makes a critical study of 299 cases of acute empyema. Exploratory aspiration was always employed to confirm the diagnosis. A certain number of accidents followed the procedure, such as subcutaneous emphysema, pneumothorax, hæmoptysis, and pleural reflexes. Acute pneumothorax gave rise to some anxiety more than once, and pleural reflexes were severe enough occasionally to cause death. Among the latter were noticed reflex disturbances in the cardio-respiratory apparatus, and on rare occasions general convulsions in children. Coma or paralysis may be

classified also as pleural reflexes when following aspiration. The operative mortality of long-standing empyemata was found to be much less than in those drained early. This should not be interpreted as meaning that empyemata should not be operated upon until a late period, when rigid uncollapsible cavities have formed and chronic sinuses are likely to follow treatment. The operation, however, should not be done when the pus is thin and has only been present for forty-eight hours. In these cases the operative mortality is highest.

Murphy³ treated chronic empyemata on the lines of metastatic infection of joints, by aspiration and injection of formalin and glycerin 2 per cent. In this way he claimed, after varying periods and repeated injections, to convert a pyothorax into a sterile hydrothorax which in time became absorbed. Wilensky does not favour this method, and tabulates the line of treatment followed in the Mount Sinai Hospital, New York, as follows :—

Methods of Treatment	Cases	Deaths	Improved	Not Imp.
Aspiration	5	—	—	3
Aspiration and saline irrigation	2	—	—	1
Murphy's treatment	7	2	—	3
Intercostal incision	21	11	2	—
Thoracotomy—				
No rib specified	89	20	16	10
Fourth rib	2	—	—	—
Fifth	3	2	—	—
Sixth	4	—	1	—
Seventh	31	6	3	3
Seventh and eighth	2	1	1	—
Eighth	84	20	9	2
Eighth and ninth	1	1	—	—
Ninth rib	37	9	4	1
Ninth and tenth	3	—	—	—
Tenth	2	—	—	—
Not operated upon	6	6	—	—

Thoracotomy with rib resection is the operation of choice. Whenever possible it should be done, and not infrequently with local anæsthesia. Drainage of the chest should occur at the most advantageous point, and as long as this condition is satisfied, the location of the incision is immaterial. Large openings are made, and wherever there are large fibrinous masses in the exudate, their removal is much facilitated by this means. Drainage is established usually with two large rubber tubes, and an occlusive dry dressing is applied. The dressing is always made as air-tight as possible by the judicious employment of rubber tissue. The patients are dressed as often as the amount of discharge indicates, and the tubes removed at the earliest opportunity.

Wilensky had not much encouragement from employment of the various methods of suction drainage of the chest.

Irrigation of the abscess cavity, either during the operation or later at each dressing, is not done as a routine measure. It has a certain amount of danger.

In a further study of eighty-two cases of *chronic empyema sinus* of the chest, the same writer³ chronicles his experiences. Under this term are included all cases having a sinus as the result of operation for empyema.

In the following table the methods employed are tabulated and the results indicated. Some of the patients were first treated by the simpler methods, and when these failed, they were subjected to the more difficult and extensive procedures :—

Methods of Treatment	Well	Improved	Not Imp.	Deaths
Iodoform wax filling	—	1	—	—
Bismuth subcarbonate filling ..	1	—	1	—
Revision ; once	16	4	3	1
Revision ; twice	1	—	1	—
Revision ; thrice	2	—	3	—
Revision ; numerous	1	—	3	—
Revision ; sequestromy	5	—	—	—
Thoracoplasty	15	2	6	4
Thoracoplasty and bone-wax filling	1	—	—	—
Estlander thoracoplasty	2	—	2	—
Schede thoracoplasty	6	—	1	—
Schede with pleural discission ..	—	—	1	—
Depage thoracoplasty	1	—	—	—
Delorme's operation	3	—	—	1
Scapula implantation	2	—	—	—
Exploration and suture of lung ..	—	—	1	—

No operative treatment, 5 cases ; results not known.

REFERENCES.—¹*Boston Med. and Surg. Jour.* 1914, ii, 523 ; ²*Surg. Gyn. and Obst.* 1915, i, 501 ; ³*Ibid.* 647.

THREAD-WORMS.

Paraffin given with benefit (*p.* 25).

THROAT AND NOSE, WOUNDS OF. J. S. Fraser, M.B., F.R.C.S.

Milligan and Westmacott¹ writing on wounds in the present war, remark on the comparative immunity from septic complications of many of the injuries of the face and neck, and attribute this to the absence of clothing in these regions and to the consequent non-contamination of the wound with portions of soiled uniform and underwear, earth, etc., as well as to the fact that in many cases the tracts of infection have communicated with the external air by way of the nasal passages, the mouth, and larynx—a circumstance unfavourable to anaerobic infection of the wounds.

Nose.—In many cases the projectile fired at a comparatively short range passed clean through the head or face—the wound of exit being hardly, if at all, larger than the wound of entrance. As the bones of the face are thinner and more brittle than those of the skull or

extremities, the projectile often passes clean through without causing splintering. In treating injuries of the head and neck, Milligan and Westmacott have always tried to maintain free drainage and to utilize to the full the antibacterial properties of the individual's tissue fluids. When a projectile or piece of shrapnel was found to be deeply embedded in the bony framework of the face, nose, or pharynx, and when there was neither troublesome hæmorrhage nor evidence of sepsis, the writers always left the foreign body severely alone, though repeated clinical and radioscopy examinations were carried out to ascertain if it remained quiescent. When, on the other hand, the projectile was quite superficial and easily accessible, it was removed. When severe laceration had taken place and tracts of highly infected tissue were present, the wound was opened up in every direction, irrigated with antiseptic lotions—especially hydrogen peroxide—and a free flow of lymph encouraged by lavage, baths, etc. In injuries of the nose and nasopharynx the immediate anxiety was often the arrest of hæmorrhage, while later on the remote one was to restore function and appearance by some plastic operation. In several cases there was severe hæmorrhage, and it was not always possible to ascertain its actual source. In few cases, however, was it necessary to do more than plug from the front. In one case of severe injury to the malar bones and nasal cavities, large doses of **Ernutin** were given with satisfactory results. In a few instances the bullet has been spat out after reaching the mouth, while in one case the writers removed a German bullet from between the layers of the soft palate. In another a bullet passed through the left superior maxilla and became embedded in the posterior wall of the left antrum. Two attacks of severe bleeding followed. The patient made a good recovery with the bullet still *in situ*. In several cases the injury was followed by dense adhesions between the turbinates and septum. The writers have found that the most effective splint in these cases is the finger of a disused rubber glove packed with gauze.

Larynx.—Milligan and Westmacott, writing of their experiences of treating the wounded in this country, state that severe injuries of the larynx are comparatively rare. In one case a bullet struck the side of the neck at the level of the upper border of the thyroid cartilage upon the left side, was deflected by the cartilage, ran down the neck, and became embedded behind the left sternoclavicular joint. Severe perichondritis of the arytenoid cartilage resulted, accompanied by such an amount of œdema as to necessitate a tracheotomy.

Boehler² gives an account of war injuries of the larynx as seen on the battlefields of Russia. He states that pointed bullets can pass down through the neck without injuring any of the vital organs of this region. Very frequently we see men who have been shot from the front, from the side, and diagonally through the neck, who have not the slightest trouble.

Boehler's first case had a transverse gun-shot wound through the larynx. There was emphysema of the skin up to the border

line of the hair and down to the nipples. He had great difficulty in breathing, and was very blue. The writer immediately performed tracheotomy, and by the next day the emphysema had somewhat gone down; but on the third day the patient had fever and dyspnoea, and subsequently died. The second case presented a wound of entrance on the right shoulder, but no wound of exit. Here again emphysema was very extensive, and the eyes were totally closed. The lower jaw could not be distinguished, and in front of the ears the skin stood off in large folds. The patient had severe attacks of suffocation, his colour was dark blue, and his pulse very rapid. The breathing improved when Boehler cut through the emphysematous tissue, which was 5 to 6 cm. in thickness. On laying the larynx bare, he found that the cartilage was perforated and that a flap indented the larynx. This flap acted like a valve, and so produced emphysema. He pulled the flap outward with a stitch, and performed tracheotomy. As there was no wound of exit, the conclusion is drawn that the soldier must have coughed out the bullet. On the following day the emphysema was less, and the patient appears to have done well. The third recorded case showed an entrance wound to the right of the larynx and an exit wound near the border of the lower jaw. The soldier was only discovered four days after his injury. His voice was weak, and he had great difficulty in swallowing, but no emphysema. Cellulitis of the subcutaneous tissues of the neck was present, with pus formation, and Boehler claims that he saved the patient from mediastinitis by operation on the battlefield.

Boehler states that military surgeons do not often see severe injuries of the larynx, because such patients die before they are attended to. He has, however, seen gunshot wounds through the upper œsophagus which healed beautifully because the patient got no food or drink. He has never seen a case of œdema of the glottis. He recommends immediate **Tracheotomy** in all cases of gunshot wound of the larynx and trachea associated with great dyspnoea and emphysema, especially if the wounded have to be transported for two or three days in common wagons on poor roads, without any surgical assistance.

REFERENCES.—¹*Jour. Laryngol. Rhinol. and Otol.* 1915, 297; ²*Surg. Gyn. and Obst.* 1915, ii, 275.

THROAT, STREPTOCOCCAL INFECTION OF.

Watery solutions of **Dahlin** constitute an effective local antiseptic (p. 15).

THUMB, DISTAL PARALYSIS OF. (See DRUMMER'S PALSY.)

THYMUS GLAND.

Frederick Langmead, M.D., F.R.C.P.

A. E. Garrod¹ has reviewed very completely the present state of our knowledge concerning the activities of this gland. The most recent experiments upon removal of the thymus in young animals

carried out by Basch, Klose and Vogt, and Matti have, he thinks, yielded results sufficiently uniform to carry the conviction that it must be numbered among the glands of internal secretion. In the puppies experimented upon, a latent period of several weeks was followed by a stage of adiposity, later by cachexia and wasting, and eventually by death in coma. Growth was arrested, and the animals developed a cretinoid condition. But the most striking and characteristic effect of thymectomy is the supervention of changes in the bones practically indistinguishable from those of rickets. Lastly, changes occur in other glands of internal secretion, such as increase of the adrenal medulla and enlargement of the thyroid, pancreas, and testis.

Of recent years the operation of thymectomy has been repeatedly performed upon children for the relief of dyspnœa; but although the mortality has been high, the effects observed in animals have not been seen. Complete thymectomy, followed by recovery, has been recorded in children of six and nine months, but it is unlikely that the removal was so complete as in animal experiments.

Of the converse effect of over-activity or perverted activity of the thymus, almost nothing is known. Attempts to counteract the effect of thymectomy in animals by thymus feeding have seemed only to aggravate the symptoms. Tumours of the thymus produce pressure symptoms but no characteristic signs, and other gross diseases of the gland, such as syphilitic and tuberculous lesions, are equally devoid of clinical interest.

In view of the results of thymectomy on animals, he thinks it is a tempting hypothesis that derangements of the function of this gland have an important share in the causation of rickets, but any evidence that the functions of the gland are impaired in human rickets is not forthcoming. It has been suggested that a form of cretinoid idiocy in children may be due to thymic defect. Thus, Klose describes the case of a boy whose twin brother died suddenly from asphyxia, and whose epiphyses were thickened and his bones bent. He was fat and idiotic, and an operation performed when he was five years old revealed complete absence of the thymus.

Garrod then considers the association of hyperplasia of the gland with sudden death. The subject, he says, is usually discussed under three heads—first, *thymic death* or sudden death of an infant apparently healthy, apart from any antecedent signs of pressure on the trachea; secondly, *thymic asthma*, a condition which may assume a more or less chronic form, or may manifest itself in paroxysms of stridulous dyspnœa; and thirdly, the condition known as *status thymico-lymphaticus* or *status lymphaticus*. The limits of normality, as regards size, are somewhat wide, and very competent observers have arrived at estimates of the average weight of the thymus in a child of two years, which differ as widely as from 9 to 10 grams to 25 or 30 grams.

Those who have seen thymus deaths of infants describe a sudden

throwing back of the head, a gasping breath, rolling up of the eyes, dilatation of the pupils, and pallor or cyanosis. Other symptoms are swelling of the tongue, clenching of the hands, and extension of the legs.

Thymic asthma he thinks must be a rare phenomenon. Many with a wide experience of sick children have never even seen a case. Generally the symptoms suggest pressure upon the trachea, and cases have been recorded in which the tracheas have shown signs of compression post mortem, and some in which the compression has been seen with the bronchoscope during life. It should be mentioned, however, that some modern anatomists hold that the trachea of a normal infant is of oval shape. Caution is needed in diagnosing thymic asthma, for it must not be forgotten that stridulous dyspnoea in infants has several causes. Around the question whether thymic asthma and thymic death in infants are due to pressure of the enlarged gland upon the trachea, blood-vessels, or nerves, there has centred no little controversy. It is difficult to doubt that, in some cases at least, thymic asthma is due to pressure, but in others the stridor appears to be due to laryngeal spasm. When we attempt to extend the pressure theory so as to include thymic death apart from obvious dyspnoea by pressure on blood-vessels and nerves, we venture, he thinks, upon less firm ground.

Paltauf's paper has placed the subject of status lymphaticus upon a broader basis. He presented the picture of a general constitutional state which predisposes to sudden death from causes apparently inadequate, and in which hyperplasia of the thymus is no longer the dominant feature, but only one of a group of deviations from the normal. Others are a pale and pasty skin, hyperplasia of the lymphatic structures of the nasopharynx and alimentary canal, and moderate enlargement of the spleen. Not a few of the factors which go to make up the clinical picture cannot be detected in the living subject. Such are general enlargement of the intestinal follicles, the unduly small aorta and the diminution of the chromaffin tissue, which may be the most important of all. An increase of lymphocytes in the blood may strengthen the diagnosis based on other evidences. The minor signs which are described by Wiesel afford comparatively little help in the case of children. Some are in the nature of congenital malformations, but others are concerned with secondary sexual characteristics, such as scantiness of hair, feminine distribution of the pubic hair in males, and genital hypoplasia.

The detection of thymic hyperplasia is no easy matter, says Garrod. Percussion may reveal a more extensive dullness than normal. Probably the most valuable indicator of hyperplasia is the shadow thrown by x rays. R. E. Humphrey regards as a valuable sign a lowering of the upper limit of the superficial cardiac dullness in the absence of other causes which might produce it.

D. P. D. Wilkie² has written of the connection between status lymphaticus and appendicitis. He submits that an acute infective abdominal condition supervening in a subject of status lymphaticus

entails two special risks: first, that of abnormally low resistance to infection; secondly, the liability to sudden death under an anaesthetic should surgical intervention be required. He illustrates this by the narration of two cases of status lymphaticus in which fulminant appendicitis occurred. Early removal of the inflamed appendix failed to influence the progress of the infection. The status lymphaticus found post mortem was responsible, in his opinion, for the low resistance of the patients to the infection. (The same conclusion was arrived at by C. McNeil in the case of fulminant pneumonia, *vide* MEDICAL ANNUAL, 1915.) A third case illustrated the other risk, and led Wilkie to advise that chloroform should never be used to induce anaesthesia in children with acute abdominal infections.

TREATMENT.—A. MacLennan² reports eight cases of **Thymectomy**. When the gland is normal in size, he says, removal of the thymus is a comparatively trivial operation, easily and rapidly performed. When, however, it is so large as to occupy a considerable section of the anterior mediastinum, to cover part of the heart and to overlap the pleurae, its successful removal becomes an operation of great difficulty, and often an impossibility. If the operation were persisted in, its mortality might exceed that of the disease. He has been unable to fix the indications for thymectomy with precision. As the result of investigation and experiments on animals he has, however, arrived at the following conclusions: (1) The gland is not essential to life or health; (2) Its function is temporary; (3) The association between it and the thyroid is close, each tending to atrophy on removal of the other; (4) In certain cases of exophthalmic goitre it is advisable that the thymus should be removed before the thyroid; (5) The action of the enlarged thymus is not mechanical but physiological. From the cases he reports, the bad results of incomplete removal of the gland are apparent. Further, the impossibility of removing the whole gland in some cases without an extensive and risky operation is demonstrated. No case ended fatally on account of the operation, though four out of the eight died in spite of it.

REFERENCES.—¹*Brit. Med. Jour.* 1914, ii, 571; ²*Ibid.* 575; ³*Ibid.* 573.

THYMUS GLAND, ENLARGEMENT OF. *J. S. Fraser, M.B., F.R.C.S.*

Bryson Delavan¹ states that diagnosis of enlarged thymus by ordinary means is often difficult, but that the Röntgen rays may be of material assistance. Routine examination of every case requiring operation would take a great deal of time and money. For this reason, suspected cases only should be examined by the *x* rays. Shurly held that we undoubtedly operated on thousands of cases of enlarged thymus without knowing it. Only a very unusual case died. Hubbard has narrated the case of an infant sent for adenoid operation. The difficulty in breathing impressed the physician, who suspected thymic asthma. A radiogram showed a merging of the thymus and heart shadows. After seven treatments by **X rays** a rapid and permanent atrophy of the gland took place.

Fischer² describes a condition of tracheal stenosis due to the presence of a hypertrophied thymus gland. The condition occurs in infants, and is associated with the danger of suffocation. A fatal case never occurs without warning symptoms, as slight dyspnœa and cyanosis, and there is often a slight but continuous stridor, especially at the end of inspiration. In many cases the respiratory difficulty disappears with growth, but in others the patient succumbs to the first, or more often second, attack of suffocation. Children suffering from this condition are usually badly nourished, owing to difficulty in suckling. The condition must be distinguished from congenital anomalies of the larynx, laryngeal papilloma, glottic œdema, spasm of the glottis, peribronchial adenitis, retropharyngeal abscess and recurrent paralysis. The purity of the voice during the free intervals excludes affections of the larynx or pharynx. In the suprasternal depression a soft round tumour may be felt during expiration, but the results obtained by percussion and radiography are unreliable. Partial intracapsular **Thymectomy** is recommended, with suturing of the anterior part of the thymus capsule to the periosteum of the sternum.

REFERENCES.—¹*Jour. Laryngol. Rhinol. and Otol.* 1915, 433; ²*Münch. med. Woch.* lxi, No. 21.

THYROID INSUFFICIENCY.

Herbert French, M.D., F.R.C.P.

Hertoghe, of Antwerp,¹ calls attention to the clinical manifestations of thyroid inadequacy, some of them little known. The possibilities of improvement under thyroid medication are admirably illustrated in *Plates XLVI* and *XLVII*, which portray examples of ordinary *myxœdema* of infantile and adult types. That there are, however, limits to these possibilities, so far as the growth of adult *myxœdematous* dwarfs is concerned, is insisted on by Hertoghe, who shows that it turns entirely on the condition of the epiphyses. If these have become ossified, the days of growth are of course over; but if the epiphyses have persisted as separate ossificatory centres beyond the age at which fusion with the diaphysis is normally complete—a condition often found in thyroid insufficiency—there is still hope of growth. The state of the epiphyses is ascertainable from skiagrams (*Plates XLVIII, XLIX*), which thus acquire considerable prognostic value. In *Plate L* is an example of *infantilism* of the Lorain type, with alopecia universalis; its dependence on hypothyroidism is proved by its remarkable response to thyroid treatment. Hertoghe also relates cases exhibiting 'rheumatoid' muscular pains, which he attributes to thyroid inadequacy on the same ground, that they were resolved by thyroid treatment. For similar reasons he believes that certain cases of *intermittent dyspnœa* should be regarded and treated as due to a shortage of thyroid, and not labelled 'asthma' as is usual. Intense dyspnœa is, according to him, a prominent feature of true *myxœdema*. Finally, certain symptoms are described as indicative of damage to the nervous system by athyreosis. Certain of these—

PLATE L.

THYROID INSUFFICIENCY

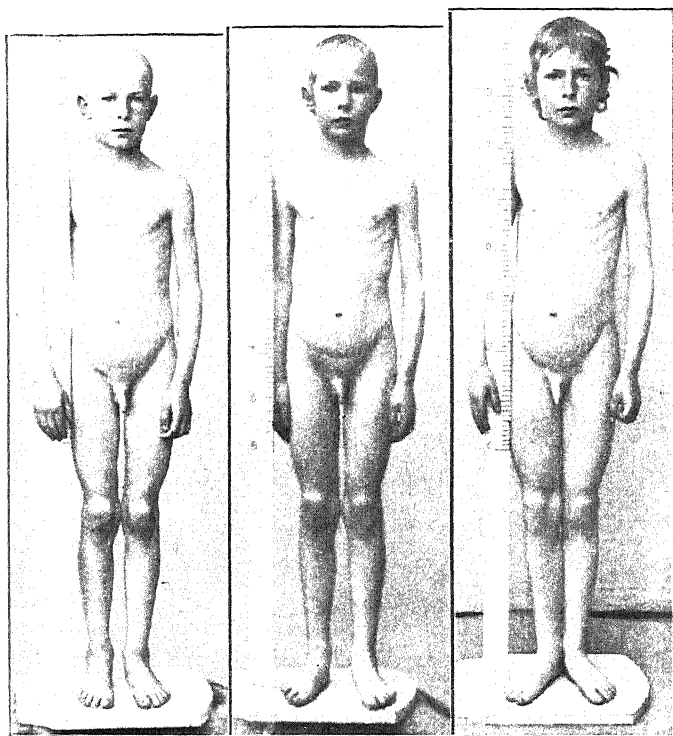


Fig. A.—Benign thyroid insufficiency; infantilism of the Lorain type. Retarded growth, alopecia universalis. Effect of thyroid extract upon the general processes of growth and upon the alopecia.

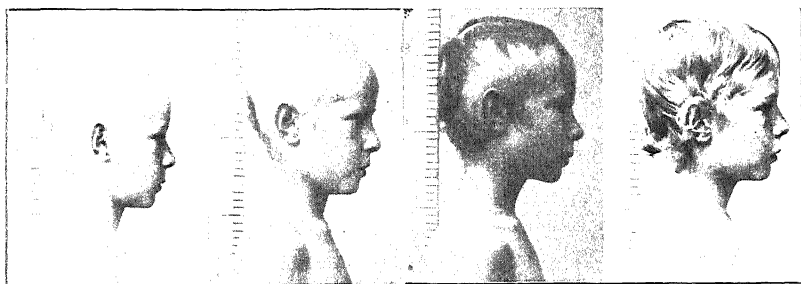


Fig. B.—Infantilism of the Lorain type : generalized alopecia. Result of thyroid medication continued for nine months.

attacks of giddiness and coma, in particular—if associated with the puffy face and albuminous urine of myxœdema, are apt to lend colour to an erroneous diagnosis of uræmia. Headaches, sometimes of a migrainous type, tinnitus aurium, visual hallucinations, somnolence, and a melancholy psychosis, are also associated with myxœdema. In another paper² Hertoghe reminds us that myxœdema may be fatal without intercurrent infection. Death in such cases is sometimes wrongly ascribed to uræmia.

Amongst the less well-recognized symptoms of hypothyroidism is the change in the voice—its diminution in power and quality; and this is amenable to relief by thyroid medication. Stress is laid upon this by Granger,³ in recording the case of a professional singer whose voice not only lost tone, but its range was seriously impaired as well, especially in the higher notes. Within a few weeks of taking thyroid her high notes were recaptured, and her voice is now as good as ever. The effect of thyroid insufficiency upon the singing voice is not well known; that is to say, alterations in the singing voice as distinct from the familiar slow and laboured speech of typical myxœdema.

Another point that Granger emphasizes is that it is far from uncommon for thyroid insufficiency to be a sequela of temporary thyroid over-activity if not of actual Graves's disease; and that if some degree of exophthalmos develops during the stage of over-activity, it persists in not a few cases after this over-activity has given place to insufficiency. One thus gets a condition of *myxœdema with exophthalmos*, a very important clinical phenomenon to which little attention has been directed hitherto. The patient runs great risk of still being regarded as a case of Graves's disease when she really wants an additional supply of thyroid secretion. In these cases, in which the facies of thyroid insufficiency is complicated by the prominent eye, an exhaustive clinical history is absolutely essential to a correct diagnosis.

Amongst other points, Granger also lays stress upon *cessation of the menstrual periods* as a sign, in many cases, of thyroid insufficiency. The patient may be far from exhibiting full-fledged myxœdema, but her tendency in that direction should be suspected if the menses stop for a prolonged period without any apparent cause; in not a few such cases the exhibition of thyroid extract in suitable doses causes the menses to appear again, and improves the patient's general condition at the same time.

REFERENCES.—¹*Pract.* 1915, i, 26; ²*Med. Rec.* 1914, ii, 489; ³*Pract.* 1915, i, 310.

THYROID SURGERY.

W. I. de C. Wheeler, F.R.C.S.I.

The terms 'hypothyroidism' and 'hyperthyroidism,' insisted upon by Kocher, and used by him to indicate the reduction below normal, or the excessive secretion of the thyroid gland, have led surgeons to study the various gradations of these two conditions. Thus hyperthyroidism may be present without any apparent enlargement of the gland, with no ocular signs, and discoverable only by the presence

of slight tachycardia, tremors, or nervousness. A case presenting all the text-book signs of Graves's disease is usually in an advanced stage of poisoning. In many cases hypothyroidism can scarcely be recognized in the absence of a simple goitre, until the administration of thyroid extract proves beneficial to the patient. For instance, it is not uncommon to find cases suffering from indefinite signs of intestinal stasis who improve so rapidly under the administration of thyroid extract that it is reasonable to suppose that metabolism was interfered with by an insufficiency of the secretion of the gland.

Although brilliant results follow operative treatment of hyperthyroidism in selected cases, medical treatment intelligently applied should in the first instance be tried. A moderate case of hyperthyroidism will be cured in three months if rigidly confined to bed in a private hospital for one month and treated by x rays; for a second month the patient is allowed to return home to follow a strict invalid régime without x rays, and for a third month resumption of ordinary avocations is permitted, in conjunction with a second course of x -ray treatment. It is essential that the doses of x rays should be administered by an experienced radiologist, and it appears to be of some advantage to concentrate the rays over the region of the thymus gland (Moorhead).

Frazier¹ gives a review of 100 consecutive operations for goitre, with special reference to the treatment of hyperthyroidism. He thinks that simple goitre may be treated by both non-surgical and surgical measures. One can advise operation in the certainty that it is peculiarly free from danger, and that there is a tendency in a considerable number of cases for simple goitres to undergo changes which will affect the heart and nervous system, and that in some instances goitres become cancerous in later life. One in four patients with simple goitre will develop a symptom-complex which in many respects is so closely analogous to true exophthalmic goitre as to be almost indistinguishable. If the tumour can be recognized as malignant by physical signs, it has become inoperable. In advising treatment in a moderate case of hyperthyroidism, Frazier takes into consideration the financial and social status of the patient. If conditions make it impossible for the patient to undergo an adequate course of treatment, operation is urged. The graver cases are kept under observation for a week with absolute rest, and by this time the condition will improve sufficiently to justify operation or to determine the best mode of treatment. Kocher considered chronic nephritis, enlarged thymus, and glycosuria as contra-indications, and thinks that lymphocytosis and a decrease in the polynuclear cells are an index of the gravity of the case. Frazier is unable to confirm this statement. Kocher, however, attached more importance to blood examination for diagnostic purposes than as a means of measuring the extent of the disease. The condition of the myocardium is of supreme importance. A dilated heart, failure of compensation, and poor muscular sounds are danger signals.

Reference is made by Frazier to the value of Crile's method of operating in cases of Graves's disease, but anoci-association was not employed in its entirety. The writer is convinced that of all surgical cases this class is the best adapted for the practice of Crile's methods. The technique is simple. The psychic disturbance may be counteracted by a hypodermic injection of omnopon and scopolamine half an hour before operation. The patient becomes careless and oblivious to the surroundings. The eyes are unobtrusively blindfolded, and the ears are plugged with wool, so that the sounds of preparation are not heard. The patient, already almost asleep, is anæsthetized by open ether, and the line of incision injected with 1 per cent novocain-adrenalin solution. Once asleep, the patient requires no further anæsthetic. The breathing is slow, and there is neither mucus nor cyanosis when omnopon and scopolamine are employed. The local injection produces vasoconstriction, so that the various fascial and muscular layers can be defined with an accuracy impossible when no local anæsthetic is used. The hæmostasis produced by the local anæsthetic is a considerable assistance in carrying out the operation.

Wyeth² suggests the use of an injection of **Boiling Water** as a cure for enlarged thyroid. The skin and the area to be injected are locally anæsthetized with novocain solution. A steel syringe taken out of the boiling cauldron is filled with boiling water, which is immediately injected by inserting the needle well into the substance of the mass. The surrounding skin is carefully guarded, and from 10 to 20 min. are injected in one spot. The needle is then partially withdrawn, and the point carried to a new field and the injection repeated. In the case in question, five injections were made in ten weeks, and in three months the goitre had entirely disappeared. It is advisable not to have the point of the needle immediately under the skin, as the excessive heat may produce necrosis. If the skin covering remains intact, all tissue destruction is harmless.

Walton³ raises the question whether cases of exophthalmic goitre should be treated by operative measures. He thinks that clinical evidence strongly supports the view that the disease is due to an excess of thyroid secretion. Many cases have developed the disease by taking too large doses of thyroid extract. Tincture of iodine administered internally has produced similar results. The fact that myxædema furnishes symptoms exactly opposite to those found in Graves's disease is another reason for thinking that the latter is due to over-secretion. Histologically also, the changes found are those to be expected from over-activity of the gland. It must be mentioned, however, that some authorities (notably Marine and Lenhart) have come to the conclusion that involvement of the gland is only a part of the general disease, and not the cause of the symptoms. A third view, which is still largely held, is that the thymus is in some way responsible for the symptoms, and Berry, in support of this, states that in no post-mortem examination of the disease has he failed to notice an enlargement of the thymus.

Walton asks, Are the results of medical treatment satisfactory? He shows from statistics that the mortality is relatively high when the treatment is too prolonged for modern conditions and hospital patients. In a number of patients improved by treatment, a relapse occurs when they return to active life. He quotes Kuttner, who watched nine patients under medical treatment for fifteen years, and not one had recovered health. As regards the mortality of operative treatment, the figures quoted by Berry from a large number of London hospitals showed 16 deaths in 97 cases, a mortality approaching that of the cases medically treated. Kocher, however, in his last report of 865 operations had only 18 deaths, or under 3 per cent. He found that a little less than half of the cases were radically cured, and that the great majority of the others had been benefited so greatly that they could earn their living without difficulty. Mayo gives a series of 278 cases without a death.

As regards the effect of operation on the disease, Fuller found that 85 per cent were cured, and that the improvement which followed operation was usually prompt. Leedham Green found that 86.2 per cent of those surgically treated were able to return to work, while 17.3 per cent died, as compared with a mortality of 35.7 per cent medically treated. Occasionally myxedema follows surgical, as it does medical, treatment.

In choosing the time for operation, there is evidence to show that the greatest height of intoxication is reached during the latter half of the first year, and then rapidly drops. Operation is safest either quite early or much later. The average duration of the symptoms at the time of operation at the Mayo clinic is about two years.

Walton discusses the question of general anæsthesia, and prefers it to a local anæsthetic on account of the mental condition of the patient. What, however, might be called a triple anæsthesia seems to provide all the safeguards necessary for these cases: (1) The preliminary injection of omnopon and scopolamine to prevent psychic phenomena and to diminish the amount of general anæsthetic necessary; (2) Local infiltration with novocain and adrenalin to cut off nocuous stimuli on the Crile hypothesis, and to produce anæmia in the field of operation, thus facilitating the definition of fascial and muscular layers; (3) Light open ether anæsthesia to render the patient unconscious.

Blair¹ makes some observations on the indications for the operative interference for goitre. He points out that the toxic stage of exophthalmic goitre has a distinct tendency to crisis and self-limitation. This is sometimes given as a reason against operative treatment, but it must be remembered that operation will in most cases reduce the period of chronic disability and prevent the permanent damage which may result when the disease is not completely cured. Some cases presenting goitre, exophthalmos, tremor, rapid heart, and nervous derangement are not necessarily cases of present goitre intoxication. The goitre may have ceased to be active, but the permanent damage

is done. In such a case no reduction of thyroid secretion will be followed by improvement, and operation will be unsuccessful. The common cause of only partial success is the removal of an insufficient amount of thyroid, but the chief object is often attained by preventing the patient obtaining a lethal dose. Blair confirms the views of others when he states that the thymus gland is apparently always enlarged, and it is contended by some that the thymus and not the thyroid is the chief factor in causing the disease. The question is still unsettled.

Judd has made some interesting observations in regard to goitre in pregnancy. In the case of exophthalmic goitre, either death in crisis or spontaneous recovery is apt to occur toward the end of pregnancy. Operations give bad results under such circumstances; the patients miscarry a month after operation, and get extremely ill or die.

REFERENCES.—¹*Ann. Surg.* 1914, ii, 583; ²*Med. Rec.* 1915, i, 893; ³*Pract.* 1914, ii, 511; ⁴*Jour. Amer. Med. Assoc.* 1915, i, 896.

TINEA CAPITIS, AND VERSICOLOR. (*Vol.* 1915, p. 612.)

TOBACCO HEART.

Carey Coombs, M.D., M.R.C.P.

It is difficult to assess the real importance of tobacco indulgence as a cause of cardiac disease and disorder, because in nearly all the cases in which it seems to play a prominent part there are other causal factors at work. This uncertainty is illustrated by two papers by Harlow Brooks¹ and R. N. Willson² respectively. The former thinks there is no evidence of any direct toxic action of tobacco on the myocardium, and ascribes the cardiac symptoms of tobacco excess to transient coronary spasm. The latter, however, accuses tobacco of injury not merely to the myocardium and vessels of the consumer, but also to those of his companions who inhale his smoke, and to his children's vessels also. It cannot be said that either view is supported by conclusive evidence.

SYMPTOMS.—Willson goes so far as to ascribe the symptoms and signs of aortic regurgitation in one of his cases to excess in tobacco. The pseudo-anginal attacks which are undeniably due to tobacco must, he thinks, be due to degenerative changes in the cardiac ganglia. Brooks, however, thinks coronary spasm is to be blamed. Whether either theory is correct or not the evidence does not suffice to show. That such attacks do occur is certain—attacks of cardiac pain clinically indistinguishable from angina due to other causes. Apart from these there may be paroxysms of tachycardia, with faintness, pallor, and even actual syncope. The pulse is bounding, and extra-systolic intermittencies may combine with the rapid action to produce a confused arrhythmia. Pain is a common feature of the attacks, which often culminate in violent vomiting. This relieves the patient almost at once.

PROGNOSIS.—In spite of the alarming nature of these attacks, they

are seldom if ever fatal. Willson thinks tobacco intoxication inevitably leads to cardiosclerosis sooner or later. Brooks, on the other hand, finds no evidence, anatomical or clinical, to support this view. At all events the physician is on safe ground who warns his patient that the attacks are serious, that they may become worse, and that nothing but abstinence from tobacco will relieve them.

TREATMENT.—The use of tobacco must be entirely forbidden. In the lighter cases, where the patient absolutely refuses to go without, some relief may be secured by advising the use of a milder brand. **Nitrites** relieve the pain as in ordinary angina.

REFERENCES.—¹N. Y. Med. Jour. 1915, i, 830 : ²*Ibid.* ii, 541.

TOBACCO POISONING. (*Vol.* 1915, p. 612.)

TONGUE, MALIGNANT DISEASE OF. W. I. de C. Wheeler, F.R.C.S.I.

Coughlin¹ draws conclusions as to *sarcoma of the tongue* from 58 cases from the English, French, and German literature, and from two under his own care. The incidence of age is of some interest. Three were apparently congenital. Some of the acquired tumours attacked children of seven weeks, ten months, two and four years. No cases whatever are reported between the ages of four and fourteen. After adult life the condition is more frequent. As regards sex, the great preponderance of cases were males. In 10 there was a history of injury. In 15 cases the disease was located within half an inch of the tip of the tongue, and there were 19 involving the base. The regional lymphatic glands were enlarged in 18 out of 37 cases in which they were mentioned. The diagnosis of sarcoma of the tongue is as difficult as the condition is rare. Chronic abscess, gumma, tuberculosis, actinomycosis, and benign growths are most likely to lead to error. Coughlin finds that the prognosis after a primary operation is not necessarily better than operation for recurrence.

One case is recorded well five years after operation for recurrence *in situ* in a round-cell sarcoma. In addition to the involvement of the local lymph-nodes, metastasis through the blood-stream to the brain was observed in one case. In another the peritoneum, mesentery, and bowel wall were the seat of secondary growths. In the third the skin was the site of metastatic deposit. Recurrence was noted up to three years and a half after operation, but no recurrence was delayed longer than this. On the other hand, metastasis was seen as early as eight days after operation.

Lydston² deplotes the continuation of inaccurate diagnosis and ill-advised treatment in surgical diseases of the tongue. He considers that the microscope and Wassermann test are friends from which we should be frequently saved. The information given by these should not rule the surgeon in doubtful cases. In experienced hands the clinical diagnosis, even admitting that occasional errors are probable, is safer in the long run than reliance upon laboratory methods. Prophylaxis is afforded in the avoidance of local irritation, careful

mouth surgery and hygiene, and total abstinence from alcohol and tobacco. All obstinate chronic lesions, whether syphilitic or not, should be excised, and thus the best time for operation is before the diagnosis of malignancy is definitely established. It follows that the oftener we operate on 'suspicion' the better for humanity.

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1915, i, 291; ²*Amer. Jour. Surg.* 1915, i, 33.

TONSILLITIS, EPIDEMIC. (*Vol.* 1915, p. 618.)

TONSILS.

J. S. Fraser, M.B., F.R.C.S.

Spirochaetal Ulceration in Soldiers.—Wyatt Wingrave¹ has met with many cases of deep ulceration of the tonsils in soldiers, both officers and men. Territorials who are taken straight from civil life and sedentary occupations are specially affected. The condition is probably identical with Vincent's angina, and is characterized by (1) Deep sloughing ulcer on one tonsil; (2) Offensive breath; (3) Presence of spirochaetes and fusiform bodies in great numbers in film preparations made from the exudate on the ulcers. The trouble begins as a raised white or grey patch which simulates diphtheria. The membrane is, however, readily detached. Although the patient feels 'seedy' there is usually no pain, and the temperature rarely exceeds 101°. In a few days the slough is either spontaneously detached or easily removed on a swab, leaving a deep, rough, crateriform ulcer which bleeds readily. If untreated, the condition may persist for several weeks. The diagnosis is made by microscopic examination of a small quantity of the slough.

Wingrave advises vigorous local methods of treatment. The most efficient antiseptics are **Trikresol** and **Formalin**. The slough should be thoroughly removed, and the ulcer swabbed with a 5 per cent solution of trikresol in alcohol, or a 25 per cent solution of lysoform. A mouth-wash of weaker solutions should also be frequently used. An excellent mouth-wash can be made by adding 5 min. of English oil of lavender to the 5 per cent solution of trikresol in alcohol. A few drops of this may be added to half a tumblerful of water.

Stark² finds that the tonsil is the seat of *Vincent's angina* in the majority of cases, but the hard palate, the gums, and tongue may be involved. In children the bone may be invaded. There are two distinct forms: exudative and necrotic. The most noticeable feature of all forms is the persistent aching pain. Up to two years ago Stark treated all his cases by text-book methods, e.g., silver nitrate, potassium permanganate, tincture of iodine, and latterly by salvarsan locally applied, but found that recovery was slow. He now recommends the **Perborate of Soda**, which splits up in the mouth, forming nascent peroxide of hydrogen. (Perborate of soda is not the same as the common borax of commerce.) Stark orders two teaspoonfuls of perborate dissolved in a glass of water, to be used frequently as a mouth-wash and gargle.

Primary Syphilis of the Tonsil.—Chancres on the lips, tongue, and tonsils are usually said to be due to kissing or to the use of infected drinking cups or pipes. Public cigar cutters, cigar or cigarette ends thrown away by syphilitics are other possible sources of infection. Osler, however, states that "mouth and tonsillar sores result as a rule from improper practices." Morton Smith³ holds that the frequency of chancre of the tonsil is due largely to the location and anatomical structure of the tonsil. The spirochætes, carried past the lips and tongue, easily lodge in the crypts of the tonsil, where an almost ideal spot is found for their development and subsequent invasion of the entire system. For some unknown reason the chancre is usually on the right tonsil. As a rule, sore throat is the first symptom. The following are important diagnostic signs: (1) Unilateral occurrence; (2) Persistence of sore throat; (3) Induration; (4) Character of the glandular enlargement. It is very important to diagnose the condition correctly, as, if it is missed by the medical man, the individual and the community suffer. As a rule the surface of the tonsil is usually eroded only, but it may be phagedænic or gangrenous. In many cases a greyish false membrane is present, while a temperature of 101° in the afternoon is usually found. At the end of a week or ten days the tonsillar lymph-glands behind the angle of the lower jaw enlarge, and soon the mass of glands takes on a smooth, brawny, pork-like hardness without suppuration. This is of the greatest diagnostic importance. With regard to differential diagnosis, one has to consider cancer, late syphilis, peritonsillar abscess, diphtheria, and Vincent's angina. In abscess the onset is sharper and the pain more severe, and, owing to involvement of the muscles, the patient opens his mouth with difficulty. Further, there is more fever in abscess cases, accompanied by headache and backache. In gumma of the tonsil the glands do not enlarge, while in cancer they only do so after several months. Vincent's angina is diagnosed by the examination of smear preparations, and diphtheria by the culture test.

Abnormal Styloid Process causing Tonsillar Irritation.—Macleod Yearsley⁴ records the case of a female, age 23, who complained of 'pressure' in the left side of the throat, also of a 'bone' in her throat, and of difficulty in producing the singing voice. The symptoms had lasted for twelve years. When asked to show the exact site of her discomfort she placed her finger on the left tonsil, and on palpation of this region a bony projection was felt buried in the lower pole of the left tonsil. It was pointed, and was situated just behind the ramus of the lower jaw. The left tonsil was dissected out, thus exposing a projecting point of bone—the incurved end of a long styloid process. About three-quarters of an inch of this was removed with punch forceps: the patient made a good recovery. Syme⁵ records a similar case.

Tonsillar Infections.—Pybus,⁶ discussing the anatomy and physiology of the tonsil, says that it forms part of the ring of lymphoid

tissue which guards the entrance to the respiratory and digestive tracts. It reaches its maximum growth in childhood, when infection is most frequent. Like other lymph-glands, the tonsil no doubt produces lymphocytes. It receives lymph from the nasal cavities and acts as a filter in infections of this region. Pigment granules injected into the nasal mucosa find their way into the tonsil, and may be extruded on to the free surface of the gland. The lacunæ of the tonsil are occupied by micro-organisms, leucocytes, and lymphocytes, and probably act as culture tubes. Under normal conditions the epithelium of the crypts is a sufficient protection against invasion, but organisms do frequently pass into the substance of the tonsil, there to be destroyed. By this process of absorbing organisms and toxins, the tonsils may act as immunizing agents to the body as a whole.

In an examination of 72 normal cases, Dwyer found the following organisms: *Streptococcus*, 50; *Pneumococcus*, 14; *Staphylococcus*, 20; *Micrococcus catarrhalis*, 12; *Diphtheria bacillus*, 16; *Diplococcus mucosus capsulatus*, 4; *Influenza bacillus*, 5; *Pyocyaneus*, *Friedlander's bacillus*, *Spirillum*, and a long curved bacillus, each in one case. In pathological conditions the tubercle bacillus, the colon bacillus, and the streptothrix of actinomycosis may be present. Active invasion of the tonsil may occur from the nose, but Pybus thinks the infection comes more often from the free surface. In the latter case it may be limited to the surface of the organ, or may spread to the sub-epithelial layer. The crypts or lacunæ may be affected, or the whole substance of the tonsil may be diseased. The spread from the tonsil is limited largely by the capsule, but infection may take place through this, causing peritonsillitis.

The *Actinomycosis streptothrix* may produce a granuloma, which may ulcerate. Infection may be conveyed directly in grain, of which a husk may lodge in the tonsil. Contaminated milk is another source. It has been demonstrated that some cows, considered clinically to be suffering from tuberculous mastitis, are really affected with actinomycosis.

Air-borne *Tubercle bacilli* entering the mouth may gain entrance to the crypts of the tonsil. A more common source of infection is contaminated milk, as shown by Mitchell in his investigations in Edinburgh. Feeding experiments on animals have demonstrated that if tuberculosis of the tonsil is found, it is probable that similar and more extensive lesions are present in the alimentary canal. Among tonsils removed in the ordinary way for hypertrophy, the percentage showing tuberculosis varies from 3 to 6. In patients dying from pulmonary tuberculosis the tonsil is affected in at least 90 per cent, while in tuberculosis of the cervical glands the tonsil can be proved to be tuberculous in at least 30 per cent. Within the tonsil, tubercle bacilli produce the characteristic formations which undergo fibrosis or caseation. The tubercles may be situated near the mouth of the lacunæ, round the circumference, or in the depth of the tonsil close to the capsule. The tonsil may contain a mass of

caseous debris or a chronic abscess surrounded by fibrous tissue. Ulceration is rare. Even when the tonsil is extensively diseased, the capsule remains free and the tonsil is readily dissected from its bed. Unfortunately there are no characteristic clinical signs in the tonsil itself to show that it is the seat of tuberculosis. Many tuberculous tonsils are quite small. Pybus states that infection of both tonsil and glands may remain latent from childhood to adult life, when a tuberculous abscess appears insidiously in the region of the tonsillar gland. Mitchell found that the bovine type of tubercle bacillus was present in 90 per cent of his cases of tuberculous cervical glands in children. With regard to treatment: Pybus advises that all cow's milk should be sterilized unless it is obtained from animals which have been tested and found to be free from tuberculosis. Delépine has found that one part of contaminated milk is capable of infecting a hundred thousand parts in sufficient degree to produce tuberculosis in guinea-pigs. Tuberculous tonsils should be removed entire in their capsules—the usual indication for this being tuberculosis of the tonsillar cervical glands. (*See also* TUBERCULOSIS IN CHILDHOOD.)

Several varieties of *Streptococci* are normally present. They may give rise to catarrhal inflammation, lacunar tonsillitis, peritonsillar inflammation and abscess, cervical bubo and suppuration. They may cause septicaemia or endocarditis after their entry from the tonsil into the blood. It is probable that tonsillar hypertrophy in childhood is due in part to the presence of streptococci. In such cases there is slight enlargement of the tonsillar lymph-glands, and anæmia. One of the most important streptococcic infections of the tonsil is that associated with *rheumatism*. Poynton and Paine, Beattie, Dixon, Walker, and others have shown that the organism found in acute rheumatism, although appearing in the lesion as a diplococcus, on cultural examination grows in chains and belongs to the streptococcus group. Rheumatic fever is often preceded by an attack of tonsillitis, while the presence of the *Streptococcus rheumaticus* in the tonsil has been experimentally proved. Poynton and Paine have shown that in a patient suffering from chronic endocarditis, organisms could be isolated from the tonsil after an attack of tonsillitis—organisms which showed the usual characters of the streptococcus of rheumatism. On inoculation into a rabbit, endocarditis was produced. The *Diplococcus rheumaticus* has also been isolated from the pia mater and endocardium in three fatal cases of chorea (cerebral rheumatism) by Poynton and Gordon Holmes. Chronic arthritis, acute neuritis, etc., may follow attacks of tonsillitis.

In the majority of cases of *appendicitis* the organisms invade the lining membrane of the appendix directly, but in others the infection arrives by the blood-stream. Acute tonsillitis and appendicitis may occur at the same time. The pneumococcus may cause a fibrinous exudate on the surface of the tonsil, or a tonsillar abscess. In some cases of *acute osteitis* the source of the infection may be traced

to the tonsils, although most cases are probably of dermic origin. Acute thyroiditis, nephritis, and purpura may all follow tonsillitis.

The diphtheria bacillus may be a harmless inhabitant of the tonsil, but, once lodged in the recesses, it is difficult to get rid of, and may cause repeated attacks of diphtheria. Such patients are a danger, not only to themselves, but to others. The remedy is to enucleate the tonsils. As scarlet fever is often ushered in by tonsillitis, some causal relation between the two must be considered established. It is still a disputed point how far the streptococci found in the throat lesion are responsible for the disease.

Infection is the main factor in causing hypertrophy of the tonsils—the infection being due to the presence of organisms in the mouth and throat. From 6 to 8 per cent of children attending the Government schools suffer from enlarged tonsils to such a degree as to necessitate operation. Pybus holds that the normal tonsil causes no symptoms. The tonsil naturally enlarges after the age of two years, and gradually declines in size after puberty. In order to determine the condition of the tonsil, the patient should be made to retch, when the true size of the gland becomes apparent. Pathological hypertrophy of the tonsil usually corresponds with the period of decay of the milk teeth. Enlarged tonsils may act mechanically, causing difficulty in speech and swallowing, while enlargement of the nasopharyngeal tonsil causes mouth-breathing, and thereby transfers to the mouth and throat the duty of filtering the inspired air. Mouth-breathing also produces dental caries. Clinically we find that rendering the mouth clean has a beneficial effect on tonsillar hypertrophy. Some enlarged tonsils meet in the middle line, as they are pedunculated (3 per cent) and lie almost entirely internal to the faucial pillars. In other (submerged) cases the tonsils may be extremely large without projecting beyond the anterior pillar (35 per cent). After infection has persisted for some time, the tonsil tends to become fibrous and smaller. If may, however, still remain septic. In order to judge of their septicity, the lacunæ should be explored with a bent probe, while in all cases the tonsillar glands should be examined by palpation.

Where the symptoms are mainly mechanical, **Partial Removal** may suffice. Where infective symptoms predominate, the source of infection must be removed, especially carious teeth. If the tonsil is not likely to recover, **Enucleation** is indicated, as also in tuberculous cervical adenitis. In slight enlargement of the cervical glands, removal of the tonsil alone is usually sufficient. No tonsil which is acutely inflamed should be removed. Pybus calls attention to the need for purer air and cleaner milk. "For more distant infections, when the tonsil is suspected of being the focus, removal is indicated when the general health condition is satisfactory."

Wilson,⁷ who advocates intervention in cases of general infection associated with tonsillitis, is in favour of the administration of **Calcium** salts before operation. He has proved by the coagulo-

meter that the normal blood-clotting time can be reduced in the adult from seven minutes to one minute after the administration of 120 gr. of calcium lactate. The drug is given in 10- to 15-gr. doses thrice daily for three or four days before operation. McLachlan, of Pittsburg, has microscopically examined 350 pairs of tonsils, and finds that when acute tonsillitis is present there is always ulceration of the lining of the crypts. He regards this as the point of entry of organisms from the mouth. Wood, of Philadelphia, has demonstrated bacteria in the tonsil after they have penetrated the cryptal epithelium, and in some of the sections the organisms were found penetrating the blood-vessel walls, and a few were even found in the blood-current.

Tonsillectomy.—There appears to be, especially in the United States, a marked reaction against indiscriminate removal of the tonsils. There is also a growing appreciation of the fact that operations are occasionally attended by danger and followed by unpleasant symptoms. Comroe⁸ expresses the hope that many tonsils may be rescued from unnecessary and undeserved slaughter. He recalls the successful escape from a somewhat similar fate of the ovary, the appendix, and the inferior turbinal. In 1912 there were in Philadelphia 37,000 recommendations to parents that their children's tonsils receive immediate attention. In New York, during the same year, 825,000 school children were under medical supervision, and 30 per cent of the cases examined had hypertrophied tonsils. The department desired to fix a standard as to when operation should be recommended, and sent a letter to a number of specialists inquiring as to the exact indications for operation. Comroe says that no two of these specialists agreed.

Richardson⁹ takes the same line as Comroe, and states that it has been thoroughly ingrained during the past decade that the tonsils are the portal of systemic infection. The small-sized, buried tonsils, we are told, are the greatest offenders. It has even been stated that no adult should possess tonsils, nor even the site from which the tonsils had ceased to exist. Richardson thinks that it is incumbent upon us to consider some of the indications for tonsillectomy. Even the layman, nowadays, holds himself competent to judge of the advisability of operation, and frequently says he has "come to have his tonsils removed." Independent of the tonsils, there are many points which may be the origin of general infection. Richardson mentions the accessory nasal cavities, the mastoid antrum, the teeth, gall-bladder, appendix, and seminal vesicles. The writer allows that it is permissible to remove hypertrophied tonsils or those which are the seat of chronic lacunar infections, or of follicular tonsillitis, or abscess formation. He even admits tonsils which are painful on swallowing or tender on pressure. What seems to Richardson objectionable, however, is the frequent removal of tonsils which show no macroscopic evidence of disease. That the possessor of this type of tonsil may be the subject of an infection that cannot be accounted

for, does not justify the removal of the tonsil. Numerous instances can be given of acute and chronic rheumatism and of rheumatoid arthritis where tonsillar enucleation has been followed by total failure to obtain relief. Some practitioners send patients with the statement that they have expressed pus from the tonsil; but in the great majority of cases Richardson fails to confirm their findings. On the other hand, he meets with many who come to him in the hope of being relieved of the faucial dryness due to tonsillectomy.

Agnew¹⁰ holds that tonsillectomy should be strictly a hospital operation, and that the patient should be closely observed until all danger of complication is passed. He records the case of a girl, age 6, whose tonsils were removed by blunt dissection aided by the cold snare. Adenoids were also removed. Bleeding was slight at the time, but two hours later there was a sudden severe arterial hæmorrhage. This recurred for days; ultimately examination showed a hole in the upper third of the posterior pillar, and presenting in this was an artery about the size of a quill, which Agnew believes to have been an abnormally placed internal carotid. He therefore ligated the common carotid, but the wound became infected and was slow in healing.

Dunbar Roy¹¹ records a case of partial paralysis of the soft palate following removal of tonsils and adenoids. He thinks that it may have been due to injury to the muscles of the soft palate during the removal of adenoids, and holds that an unnecessary amount of force and traumatism is frequently used in this operation. It is very easy to over-stretch the soft palate even by a digital examination of the nasopharynx.

REFERENCES.—¹*Lancet*, 1915, ii, 176; ²*Ann. Otol. etc.*, 1915, Mar. 48; ³*Boston Med. and Surg. Jour.* 1914, ii, 408; ⁴*Jour. Laryngol. Rhinol. and Otol.* 1915, 116; ⁵*Ibid.* 303; ⁶*Lancet*, 1915, i, 1009; ⁷*Jour. Amer. Med. Assoc.* 1914, ii, 1638; ⁸*Ibid.* 1367; ⁹*Laryngoscope*, 1915, 293; ¹⁰*Ann. Otol. etc.*, 1519, Mar. 44; ¹¹*Laryngoscope*, 1915, 361.

TORTICOLLIS.

W. I. de C. Wheeler, F.R.C.S.I.

Roth¹ pleads for simpler treatment than that usually adopted, and can find no good reason for the abandonment of simple subcutaneous division of the sternal head of the sternomastoid. He holds: (1) That as a rule division of the sternal head is sufficient; (2) That whether the clavicular head is divided or not, the operation should always be done subcutaneously; (3) That retentive apparatus after the operation is entirely unnecessary. The dangers of the operation mentioned in almost every text-book apparently have little foundation, and do not bear investigation.

REFERENCE.—¹*Brit. Med. Jour.* 1914, ii, 667.

TRACHEOTOMY. (*Vol.* 1915, p. 624.)

TRENCH FOOT.

Electrotherapeutics in, see p. 63. (*See also* FROSTBITE.)

TRICHINOSIS. (*Vol.* 1915, *p.* 625.)

TRICHOTILLOMANIA.

E. Graham Little, M.D., F.R.C.P.

This cacophonous title is applied to a group of neuropathic cases in which the patients, almost exclusively female, pull out or otherwise remove their hair. Pernet¹ reports two cases in whom this mania was associated with hysterical self-mutilation. The patches denuded of hair may resemble alopecia areata superficially; but the loss is much more irregular, and usually broken hair and other evidence of mechanical injury are obtainable. **Valerianate of Zinc**, a local lotion which is not further specified, and **Suggestion** seemed to succeed well in the first case.

REFERENCE.—¹*Brit. Jour. Derm.* 1915, 85.

TRYPANOSOMIASIS.

Sir Leonard Rogers, M.D., F.R.C.P.

Sir David Bruce, in his Croonian Lectures,¹ has given an excellent *résumé* of the difficult subject of trypanosomes causing disease in man and domestic animals in Central Africa, on which he has done such a vast amount of work during the last twenty years. In his first lecture he dealt with the vexed subject of the classification of trypanosomes, which he reduces to three well-defined groups and nine species, the geographical distribution of which is given and illustrated by a map. The characters and habits of tsetse flies are also dealt with. His first class, called the *Trypanosoma brucei* group, includes the two species pathogenic for man, *T. brucei* and *T. gambiense*, the *T. evansi* of surra, a disease mainly of horses in India and Eastern Asia, and *T. equiperdum* of dourine of horses in North Africa and parts of Europe. The second class, *T. pecorum* group, includes *T. pecorum*, a very small species affecting horses, donkeys, oxen, sheep, goats, and pigs, which may be spread by tabanidæ (horse-flies) as well as tsetse flies, while the development in the *Glossina morsitans* begins in the gut and passes forward to infect the salivary duct or hypopharynx, but not the salivary gland; and, secondly, the *T. simiae*, which is very virulent for pigs and monkeys, while the wart-hog is the only wild animal known to harbour it. The third class, *Trypanosoma vivax* group, is characterized by very rapid movements, while the development in the *Glossina morsitans* takes place at first only in the labial cavity of the proboscis, and never in the gut; the salivary duct or hypopharynx being infected later. They affect only horses, cattle, goats, and sheep. There are four species which differ in little but size. The last two classes are described in the fourth lecture; but as they do not affect man they need not concern us further, and we may return to the consideration of the human forms of the disease.

The history of the discoveries regarding *T. brucei* is a very interesting one. In 1894-6 Bruce investigated the disease of cattle in Zululand, known as 'nagana.' He discovered by careful experimental work that it was due to a trypanosome, and that the infection was carried by tsetse flies. This trypanosome was sent to England in

animals and carefully studied, but was not known to be infective to man. In 1910 Stephens was studying a trypanosome in a rat infected from the blood of a sleeping-sickness patient from Rhodesia, and noticed marked peculiarity in its morphology. After further work with Fantham, he described it as a new species under the name *T. rhodesiense*, drawing particular attention to the occurrence of short stumpy forms with the nucleus near the posterior end, such as are not met with in *T. gambiense* of ordinary sleeping sickness of West Africa and Uganda. In 1911, Bruce went out to Nyassaland for the Royal Society, and found that the trypanosome of wild animals in that part of Africa was always the *T. rhodesiense*, and suspecting that it was his old friend the nagana parasite, he obtained a strain from his original field of work of 1894 in Zululand, and proved that *T. rhodesiense* was identical with *T. brucei* originally discovered by him. It follows that the Nyassaland form of sleeping-sickness, which is a more severe and fatal form than the more northern *gambiense* type, may occur wherever the *T. brucei* is met with, which includes the greater part of Central Africa. This parasite is pathogenic to many mammals, including man, horses, mules, donkeys, oxen, goats, sheep, monkeys, and dogs, as well as large numbers of wild game, such as antelopes, etc. In man it usually runs a fatal course within three or four months, as against any time up to several years in the case of *T. gambiense*, but produces a chronic affection in oxen. As originally shown by Bruce in the case of the cattle disease, the infection is carried by the *Glossina morsitans*. About one in five hundred wild flies can carry the disease. The wild animals of the districts constitute a reservoir of the disease, as they harbour the parasites in their blood without suffering, and flies are infected from them. No less than 32 per cent of the wild animals have been found to harbour the infection. He therefore concludes that the present laws to preserve game in the inhabited parts are as reasonable as to allow mad dogs to live and be protected in English villages.

The second form of human disease is due to the *T. gambiense* of Congo sleeping-sickness, which was first seen by Forde, and its nature recognized by Dutton in 1901 in cases of slight chronic fever in West Africa. In 1902, Dutton and Todd found the parasite in the blood of only 6 out of 1043 natives examined, and looked on the disease as a very mild one. It was not until 1903 that the Royal Society Commission under Bruce proved that sleeping-sickness in Uganda, which had been carried there from the Congo, probably by Emin Pasha's men, was due to this organism. It never presents the forms with the nucleus at the posterior end, so it can probably be recognized in man by blood examinations alone. It also differs from *T. brucei* by being almost wholly confined to man under natural conditions. It can be inoculated into rats, and with greater difficulty into goats, monkeys, dogs and guinea-pigs, while the disease is much more chronic in nature than that produced by *T. brucei*. The infection is carried by the *Glossina palpalis*, which is found only near rivers and lakes, and never

far from water, although the *G. morsitans* is found in dry jungle regions. Among a highly infected population as many as 11.2 per cent of wild flies have been found infective; but since the people have been removed from the northern shores of the Victoria Nyanza Lake, the proportion has fallen through 1.2 per cent after one year to only 0.14 at the end of six years. It was at first thought that by removing the people the infection would die out of the flies within a year, but it has now been proved that antelopes form a natural reservoir for *T. gambiense*, and the lake shores still remain infected. The development of the two forms of human trypanosomes in tsetse flies is the same; for three or four days after ingesting infected blood the trypanosomes are found in the gut, but in most of the flies they die out within the next few days. In a small percentage of them, about 5 per cent as first shown by Kleine, extensive further development takes place in the gut, where they ultimately reach very large numbers. Subsequently they pass up and enter the salivary glands, and the flies now become very infective after about twenty-five days, and remain so usually as long as they live, which may be for months. Treatment is not dealt with in these lectures.

J. W. Scott Macfie² reports on sleeping-sickness in the Eket district of Nigeria, where it had not been suspected until recently, when Eakin detected the disease. The natives state that it has long existed, but has become more prevalent in recent years. During the last sixteen months trypanosomes have been found in 222 cases, chiefly by gland puncture or excision, as it has not been found in the blood. Only nine have as yet proved fatal, the disease being very mild. The glands are nearly always enlarged, and natives have a custom of excising them. Atoxyl was injected intramuscularly in 6-gr. doses weekly without ill result, but it is too early to say if it did good. Macfie thinks the trypanosome shows some peculiarities of morphology, while its virulence is very low for small laboratory animals, so he suggests that it is a new species, but on very slender evidence. *Glossina palpalis* is rare in the district, but *G. tachnoides* is more abundant, and may possibly be a carrier of the infection.

A. J. Chalmers and W. R. O'Farrell³ describe the prevalence of sleeping-sickness in the Lado portion of the Anglo-Egyptian Sudan. The organism is similar to *T. gambiense*. Some of the cases are very chronic and some acute.

TREATMENT.—H. Seidelin⁴ has tested **Salvarsan-copper** on *T. brucei* in white rats, which greatly reduced the parasites in the blood, but he is not convinced regarding its therapeutical value.

REFERENCES.—¹*Brit. Med. Jour.* 1915, i, 1073; ²*Ann. Trop. Med.* 1914, 379; ³*Jour. Trop. Med.* 1914, 273; ⁴*Ann. Trop. Med.* 1915, Mar. 197.

TUBERCULOSIS, PULMONARY.

Lewis A. Conner, M.D.

ETIOLOGY.—In discussing the question of *milk supply* as a causal factor in tuberculosis, Délépine¹ postulates, that, if it can be shown that the reduction in the mortality from tuberculous diseases other than phthisis is proportionally greater than that from phthisis and

from all causes, it is only reasonable to conclude that this result is in all probability due to improvement in the milk, and that the amount of this improvement may be taken as a basis for an approximate estimate of the share taken by bovine tuberculosis in the infection of human beings. He then presents statistics to show that in the city of Manchester in the past twenty years, during which time great efforts have been made to improve the quality of the milk supply, there has been a considerably greater reduction in the death-rate for tuberculous diseases other than phthisis than in that for phthisis or in that for all causes. This increased reduction is especially marked in the death-rate for such diseases in young children. The conclusion seems justified, therefore, that this result is related to the improvement in the milk supply, and that there is clear and cumulative evidence that cow's milk plays a very important part in the production of infantile tuberculosis.

Kenwood and Dove² have attempted to test the risk of transmission of tuberculosis by *books*. As a result of the inoculation into guinea-pigs of the washings from the soiled leaves and covers of books recently read and handled by patients known to have tubercle bacilli in their sputum, they conclude that there is probably no material risk involved in the re-issue of books recently read by consumptives unless they are obviously soiled. Even then the risks are very slight. In order, however, to avoid even this, books recently received from consumptive readers should not be re-issued until they have either been disinfected or placed 'in quarantine' in a separate room for the period of a month. Very dirty books should be withdrawn from circulation. They suggest that all library books should be marked with the following printed cautions to readers: (1) Not to cough into a book; always to cough into a handkerchief; (2) Not to moisten the fingers when reading; the hands should always be dry and clean; (3) Always to keep the book closed when it is not being read.

The desirability of having some accurate data concerning the variations in *tuberculin hypersensitiveness* in the course of pulmonary tuberculosis led Holmes³ to undertake an investigation. Because of the unsuitability of the cutaneous test for such a quantitative study, the intracutaneous test of Mendel was used, and was found to be accurate and satisfactory. Doses of 0.05 c.c. of tuberculin solutions of graduated strength were injected into the skin of the forearm, varying from 0.00001 to 0.01 mgm. Readings were made at the end of forty-eight hours, when the tuberculin reaction had reached its height and when the control traumatic reaction had disappeared. Eighty tuberculous individuals were studied, and 550 tests in all were made. It was found that patients with incipient tuberculosis upon entering the sanatorium usually showed marked hypersensitiveness to tuberculin, which diminished rapidly with rest in bed and improved diet. If the patient did well, the hypersensitiveness fell and remained down; if he did badly, it rose, and then fell again as his condition improved. In the advanced and progressive cases, after

rising to a maximum point it usually fell, and towards the end the patient might even fail to react to the maximum dose employed (0.01 mgram). The degree of hypersensitiveness present in an individual seemed to bear no relation to the amount of pulmonary involvement, but did seem to be related to the activity of the focus and to the patient's response. No definite interval between the appearance of an exacerbation and the development of hypersensitiveness was observed, and a rise in hypersensitiveness never gave warning of an approaching exacerbation. In patients undergoing treatment by subcutaneous injections of tuberculin, the tests failed to show any relation between the amount of tuberculin tolerated and the grade of hypersensitiveness present.

Hawes,¹ reviewing the features of pulmonary tuberculosis in the aged, estimates that at least 2 per cent of all cases of active tuberculosis are found in persons of sixty years of age or over. This group, though relatively small, is a source of great danger to the community, because the disease so frequently passes unrecognized. The course is a chronic one, and is compatible with years of fairly comfortable life, although a definite cure or permanent arrest never occurs. The diagnosis is difficult, as the co-existence of asthma, emphysema, and chronic bronchitis so often masks the symptoms and confuses the physical signs. Frequent examinations of the sputum should be made in all doubtful cases. A Röntgen-ray examination is often of great value in diagnosis. The insistence upon a strict outdoor régime in cold weather is usually inadvisable. Such patients usually do best in a warm, dry climate.

DIAGNOSIS.—Glover² emphasizes the importance of identifying cases of recently healed or obsolete tuberculosis, and of excluding these from sanatorium treatment. This diagnosis can rarely be made on the strength of clinical examination alone. He investigated forty-seven cases certified as pulmonary tuberculosis and admitted to a sanatorium. Each case was subjected to as exhaustive a series of tests as possible with a view to finding, in the first place, in what percentage the diagnosis of active disease could be confirmed, and, next, what tests or series of tests give the most reliable results in diagnosis. The cutaneous tuberculin test, the precipitin reaction, the albumin reaction in the sputum, and Arneft's nuclear count were all excluded as being either unreliable or not generally applicable. In addition to sputum examinations, the tests finally decided upon as being most trustworthy were the complement-fixation reaction, the estimation of the tuberculo-opsonic index, and the subcutaneous injection of test doses of tuberculin after the method of Bandelier and Roepke. The reasons for selecting these, and the details of their technique, are fully discussed. As regards the serum reactions, the results of the study indicated that (1) Positive complement fixation is strong presumptive evidence of active or quiescent disease; (2) Positive complement fixation plus a positive opsonic index is definite evidence of active disease; (3) A positive opsonic index is definite

evidence of active or quiescent disease ; (4) Negative complement fixation is in nine cases out of ten evidence against active disease ; (5) Negative complement fixation plus a negative opsonic index is almost definite evidence against active disease ; (6) A repeatedly negative opsonic index is definite evidence against active disease.

As a result of his investigations, Glover concludes : (1) That about 62 per cent of cases coming under observation as supposed early phthisis, but with no bacilli in the sputum, prove to be negative ; nevertheless, (2) That such negative cases may present clinical signs of impairment of percussion note, breath sounds, and resonance at at least one apex ; and (3) That moist sounds in such cases are almost invariably absent ; therefore (4) It is not justifiable to diagnose active tuberculosis on the strength only of impairment of an apex ; (5) That active disease confined to one apex, with a repeatedly negative sputum, is not common ; (6) That where moist sounds are present, further investigation is needed to exclude or confirm the presence of active disease ; (7) That when this investigation takes the form of the complement-fixation reaction along with the estimation of the opsonic index (if necessary, repeatedly), a final diagnosis can be made without recourse to test injections of tuberculin.

Riviere⁶ describes at length certain changes in the pulmonary percussion note which, he says, are regularly to be found in pulmonary tuberculosis. These changes consist in characteristic bands of percussion impairment, of constant position, shape, and size, which are present over both lungs, and which are to be found before any other physical sign of phthisis is appreciable. These are not caused by underlying tuberculous deposits, as might be supposed, but are of reflex origin and may be produced by approximate means in any normal chest. Posteriorly over both lungs are to be found two areas of impaired resonance, the lower lying between the levels of the fifth and seventh dorsal spines and extending outward as a peninsular over the scapular regions, and the upper lying between the apex and a level marked by the interval between the first and second dorsal vertebræ. These two areas are more marked on the side of the lesion, or of the more advanced lesion, and are still demonstrable as bands of increased dullness when the tuberculous process has spread over the whole lung to the base. In many cases they are apparent to coarse percussion, but in cases of early disease they are recognizable only by gentle percussion and by attention to the heightened pitch of the percussion note. The explanation of these symmetrical areas of lessened resonance lies, so Riviere believes, in a reflex contraction of the lungs caused by inflammatory irritation of the lung parenchyma. The dull areas correspond accurately with those found in normal chests after heavy percussion, for example, below one clavicle. This condition was first noted by Abrams, and was called by him 'the lung reflex of contraction.' In normal lungs the areas of diminished resonance persist only for a few minutes at most, whereas in inflammatory conditions of the lung they are more or less constant

and permanent. These percussion areas are not peculiar to tuberculosis, but may be observed in any inflammatory lesion of the lung parenchyma, but they do not occur in affections of the bronchi without involvement of the lung tissue. For this reason, and because of their very early appearance in tuberculosis, they are to be regarded as of great diagnostic importance in this disease. Riviere summarizes his claims as follows: "That the earliest signs obtainable in cases of pulmonary tuberculosis are those which fall under the heading of percussion changes; that these changes are of characteristic position, shape, and size, and that they are of reflex origin; that they are in no way 'specific' or peculiar to tubercle, but are evidence of an inflammation of the lung parenchyma; that they bear no relation to the distribution of the pulmonary lesions save by indicating the side of disease or of most advanced disease, and, in the case of an early focus, its level in the lung to a rough extent."

An analysis of the mistakes in diagnosis, as shown by autopsies made at the Boston Consumption Hospital, is made by Ash.⁷ Among 198 necropsies, 23 cases (11.5 per cent) proved to be non-tuberculous (or, at least, to have no active lesion). The patients had all been admitted as cases of tuberculosis, although 7 of the 23 cases were recognized ante mortem as being non-tuberculous, and 5 others were under observation for less than three days. In 8 of the 23 cases the cause of death was some complication of pneumonia (empyema, gangrene and abscess, delayed resolution, fibrinous pericarditis). In a second group there were 2 cases of aortic aneurysm, 4 of chronic cardiac lesions, and 1 of cardiorenal disease. In the next group were 5 cases of malignant disease—1 primary in the lung, 3 metastatic in the lung, and 1 in the pleura and bronchial glands. Of the remaining cases, 1 showed chronic bronchitis and chronic cystitis, 1 pyelonephritis, and 1 actinomycosis of lung, liver, and spleen. In 8 of these cases the sputum had at some time been reported as showing tubercle bacilli. Investigation showed that in eight other institutions for tuberculosis, among 335 necropsies there were 38 non-tuberculous cases—an average of 10.8 per cent. Of these, 58 per cent were instances of cardiorenal disease.

Cooke⁸ finds it a matter for regret that the *Arneth nuclear count* is not more generally utilized. He believes it to be of great value in diagnosis, in prognosis, and as a guide to treatment. Cases of pulmonary tuberculosis often present themselves with suspicious symptoms but with only indefinite physical signs. If in such a case a blood-film shows an increase in the large mononuclears, perhaps a slight increase in lymphocytes, and a dislocation of the Arneth count to the left—i.e., an increase in the polymorphonuclear cells of Classes I and II—he regards this as strong evidence of the existence of an active tuberculous focus. A case with but few physical signs presenting a marked dislocation of the count to the left, which does not improve under treatment, must be looked upon as in grave condition. There is probably a larger amount of mischief than is indicated by

the physical signs. If the count tends to assume a more right-handed appearance, the prognosis becomes more hopeful according to the amount of that improvement. In treatment by tuberculin the count affords evidence as to whether the focal reactions are taxing the patient's capacity for dealing with the toxins resulting from them. If tuberculin be pushed too far, there appears an increase in the cells of Classes I and II. If the count is stationary, the dose has for the time being reached its therapeutic maximum.

The value of **X Rays** in diagnosis (*p.* 52).

TREATMENT.—A detailed statistical analysis of the fate of over 1500 tuberculous patients who had undergone **Sanatorium Treatment** is given by Guy.⁹ An inquiry was made in March, 1912, concerning the condition of patients discharged during the years 1907 to 1911 inclusive. Of the 1522 cases investigated, approximately 30 per cent had been classified as 'early' cases, 50 per cent as 'moderately advanced,' and 20 per cent as 'advanced.' A *résumé* of the results of the inquiry is given in the following table :—

Year	No. of Patients	Well	Not Well	Dead	Untraced
1907	226	22	3	108	93
1908	289	32	13	115	129
1909	318	42	19	149	108
1910	334	64	18	131	121
1911	355	142	69	85	59
Total	1522	302 or 19·8%	122 or 8%	588 or 38·6%	510 or 33·5%

A somewhat similar investigation was made by Wolman and Hirschman,¹⁰ who followed the subsequent course of 141 patients discharged from the Maryland State Sanatorium. At the time of the report only 30 of these 141 patients were improved, whereas 51 were dead and the remainder were either unimproved or were worse. This poor showing the writers ascribe in great part to the premature dismissal of patients, especially when these belong to the poorer classes. They recommend one or two years' residence for early cases, an indefinite stay for active cases, and the privilege of readmission for relapsed cases.

Tuberculin.—An interesting account is given by Professor Denys,¹¹ of Louvain, of his method of treatment by the use of the simple filtrate of a culture of tubercle bacilli in broth ('bouillon filtré'). The advantages of this form of tuberculin over those commonly employed are presented; the method of administration is given in detail, and the results in some 440 cases are analyzed. The paper is worthy of careful perusal as an authoritative presentation of the claims of this special form of tuberculin.

Bardswell,¹² basing his opinion upon personal experiences with tuberculin at King Edward VII Sanatorium, believes that, while it

is impossible at present to give anything like a final opinion as to the value of tuberculin, there is reason to think that in a certain proportion of the cases—25 to 30 per cent—this treatment exercised some favourable influence. This was recognized chiefly in the more rapid disappearance of tubercle bacilli from the sputum. The type of patient who seemed most likely to be benefited by tuberculin was the one who had responded promptly to general hygienic measures and had shown evidences of constitutional vigour and recuperative power. The addition of tuberculin to the treatment of many such cases seemed to hasten the full establishment of convalescence. On the other hand, in a considerable number tuberculin produced no obvious effects, and in some seemed actually to be harmful. No benefit was noticeable in the treatment of febrile cases, and no antipyretic effect could be detected. "Tuberculin cannot be looked upon as a means whereby an unfavourable case can be converted into a favourable one, or as likely to turn the scale in the patient's favour when his progress is hesitating or definitely retrogressive. More often than not it will do harm. It follows, then, that the administration of tuberculin is quite unsuitable as a routine method of treatment for all cases of pulmonary tuberculosis, and that its indiscriminate and careless use on a large scale can only end in disasters." Upon the much disputed point as to whether or not it is safe to produce reactions from tuberculin, Bardswell takes a very definite stand. He is convinced that only such cases as run a reactionless course are likely to derive benefit from the treatment, and that reactions are often a source of real danger and should be most carefully avoided.

Prophylactic inoculation against tuberculosis, especially in families in which cases of tuberculosis have arisen, is advocated by Crofton,¹³ who has used it in such cases for the past eight years and believes that he has seen encouraging results. Because of the fact that none of the ordinary tuberculins is a very satisfactory antigen, he recommends the use of tuberculin made by dissolving tubercle bacilli in benzoyl chloride. Details of the method of making the tuberculin and of carrying out the prophylactic inoculations are described.

Waters¹⁴ reports the results of his experiments, both bacteriological and clinical, with a gaseous substance which he calls **Oxypinene**, which is formed by the union of the vapour of pinene, a constituent of the oil of turpentine, with ozonized air. The gas was found to have marked germicidal effects upon various forms of bacteria, and, when used by inhalation in 20 cases of pulmonary tuberculosis, most of which were in an advanced stage of the disease, resulted in relief of the dry, ineffectual cough, increase and thinning of the sputum, and improvement in the appetite and general nutrition of the patient.

The treatment of *hæmoptysis* in pulmonary tuberculosis is discussed by Burns,¹⁵ who advises (1) Absolute rest in a semi-recumbent position; (2) The lowering of blood-pressure by an immediate subcutaneous injection of **Nitroglycerin**; (3) The deflection of blood

to other parts of the body by the use of **Ice** to the chest and by free **Purgation** of the intestinal tract; and (4) The positive assurance to the patient that he is in no danger. Burns is strongly opposed to the routine use of morphine as tending to produce constipation, to interfere with lowering of blood-pressure, and to increase the danger of post-hæmorrhagic pneumonia. The avoidance of constipation he regards as of great importance.

Artificial Pneumothorax.—Testimony to the value of this form of treatment continues to accumulate, and the procedure seems to have made a permanent place for itself as an adjunct to other established methods of treatment. Its indications and contra-indications are becoming more clearly defined, and such matters as the technique of operation, the dosage, and the interval between refillings seem to be approaching some degree of standardization. It is generally agreed that, at the first operation, the quantity of nitrogen introduced should be small (between 100 and 500 c.c.), and that the injections should be repeated at intervals of from two to four days until complete collapse of the lung is secured, if this be possible. Later the injections are given at increasing intervals, up to three or four weeks, with the object of maintaining a fairly constant compression of the lung. The subject is treated comprehensively in articles by Balboni¹⁶ and Fishberg.¹⁷ The former is convinced that in order to secure the greatest advantage from this treatment it must be carried out in a sanatorium or hospital, and not in the home. Lister,¹⁸ discussing the after-treatment of artificial pneumothorax, believes that while the selection of suitable cases and the performance of the initial operation are likely to be left in the hands of sanatorium officers or of those specially experienced in this procedure, the time required to complete the treatment (not less than two years) makes it difficult for sanatoria to retain patients throughout this period, and therefore general practitioners are likely to be called upon to continue the treatment, and should be prepared to do so. After a pneumothorax has been established, the subsequent operations of refilling are so simple that there should be no difficulty, provided suitable apparatus is at hand. He discusses at length the use of the Woodcock apparatus, and describes a regulator, devised by him, for use with it, which simplifies its manipulations. Lister holds that, if the patient remains free from symptoms for two years, the refillings may be discontinued, although the patient should be kept under observation.

Woodecock and Clark¹⁹ discuss some of the results of their experience in over 2000 operations. In early cases, with little pleuritic thickening, although the operation is easy there is danger of severe shock, and to avoid this the first operation is divided into three stages. At the first séance the various steps of preparation are gone through, including the introduction of the local anæsthetic. Four days later the process is carried farther, and the needle is pushed in until the oscillation of the manometer shows that it is in the pleural cavity; but the actual introduction of gas is reserved for the third

performance several days later. Even with all these precautions, symptoms of shock sometimes appear. In the more severe cases, often with bilateral disease and a considerable amount of pleuritic thickening, shock is much less to be feared. The difficulty here is to find the pleural cavity, and the chief danger is gas embolism. After four or five injections it is often necessary to change the site of operation, as a local pleurisy seems often to result from the traumatism of the repeated punctures.

There is much evidence to show that only a very small percentage of cases are suitable for this form of treatment. Among 210 patients entering the sanatorium, Fishberg found only 22 apparently suitable cases (10 per cent), and this he believes to be an unusually high proportion. It is probable, he thinks, that less than 5 per cent of all the cases coming under observation belong in this category. Moreover, in a considerable proportion of these apparently suitable cases it is impossible to produce even partial collapse of the lung because of the pleural adhesions. The percentage of such failures may run as high as 50, as in the series of Lent.²⁰ Lyon²¹ analyzes his results in the 74 patients in whom this treatment was attempted. He finds that 31 per cent were benefited, and that 69 per cent were not. Most of his cases belonged either to the moderately advanced or the far advanced stage. While recognizing the value of the treatment for certain carefully selected cases, he admits that the results are often contradictory and disappointing. The dictum that "artificial pneumothorax can do no harm, even though it should fail to benefit," he believes to be fallacious, and insists that just as definite and serious damage may result from its careless or ignorant administration as from tuberculin.

In Sloan's²² series of 43 patients, treated over periods varying from three months to three years and a half, the treatment had influenced the course of the disease little or not at all in 60 per cent, although in many of the cases it had relieved the distressing symptoms; the remaining 40 per cent had been benefited and were doing well; and in 10 per cent of the whole there had been restoration to perfect health and to complete working capacity for a period of over two years and a half. As unsuitable for this form of treatment, Sloan includes patients showing: (1) Gross and active lesions extending below the level of the third rib on both sides; (2) An extensive gross lesion in one lung and a lesion located at the base in the other; (3) Serious complications, such as cardiac disease, arteriosclerosis, ulcerative laryngitis, chronic diarrhoea, extensive tuberculous ostitis and nephritis, either acute or chronic; (4) Disease apparently of long standing, as shown by marked fibrosis of the lungs, thoracic deformities, decided cardiac displacement, and dyspnoea; (5) A history of chronic alcoholism; (6) A history of recurring hæmorrhage from both lungs; (7) A marked emphysema; (8) An erratic and excitable temperament; (9) Real or apparent old age.

Considerable difference of opinion exists as to the propriety of

applying this form of treatment to early, incipient cases. Riviere²³ thinks that it should not be advised for any case that is still curable by other methods, and that it should be considered only when modern sanatorium treatment has not sufficed to arrest the disease, or when cases present themselves too late for such treatment.

REFERENCES.—¹*Brit. Jour. Tubercul.* 1914, 195; ²*Lancet*, 1915, ii, 66; ³*Johns Hop. Hosp. Bull.* 1915, 12; ⁴*Amer. Jour. Med. Sci.* 1915, 664; ⁵*Quart. Jour. Med.* 1915, viii, 339; ⁶*Lancet*, 1915, ii, 387; ⁷*Jour. Amer. Med. Assoc.* 1915, ii, 11; ⁸*Brit. Jour. Tubercul.* 1914, 211; ⁹*Edin. Med. Jour.* 1915, i, 25; ¹⁰*Johns Hop. Hosp. Bull.* 1915, 291; ¹¹*Edin. Med. Jour.* 1915, ii, 85; ¹²*Lancet*, 1915, i, 68; ¹³*Brit. Med. Jour.* 1915, i, 629; ¹⁴*Med. Rec.* 1915, i, 263; ¹⁵*Boston Med. and Surg. Jour.* 1914, ii, 434; ¹⁶*Ibid.* 697 and 955; ¹⁷*Med. Rec.* 1915, i, 1; ¹⁸*Univ. Med. Rec.* 1914, 465; ¹⁹*Brit. Med. Jour.* 1914, ii, 1016; ²⁰*Jour. Amer. Med. Assoc.* 1915, ii, 1973; ²¹*Boston Med. and Surg. Jour.* 1914, ii, 442; ²²*Johns Hop. Hosp. Bull.* 1915, 289; ²³*Pract.* 1914, ii, 792.

TUBERCULOSIS IN CHILDHOOD. Frederick Langmead, M.D., F.R.C.P.

Many authorities now believe that the great majority of children become infected with tuberculosis in one form or another before they attain the age of twelve years. The question of practical importance, however, is, not so much the frequency with which it occurs, as how often it presents itself among children as an active disease for which treatment is required. This is the view taken by S. W. McLellan.¹ It is in the von Pirquet test that much reliance has been placed as to the incidence of tuberculosis in children. McLellan is of the opinion that the general belief as to the value of the test may be briefly stated thus: (1) That as a proof of active tuberculosis after the age of three it is unreliable; (2) That under the age of three years a positive or negative result can only be accepted as a proof of the presence or absence of disease with many reservations; (3) That the younger the child the greater is the reliance that may be put on the result. In other words, the only deduction that can generally be drawn from a positive reaction is that the patient has at some time or other been subjected to an attack by the tubercle bacillus. Attempts have been made to determine the degree of the infection by the employment of tuberculin of different strengths and quantities, and by the subsequent estimation of the various local, focal, or general reactions, but their value is still undecided.

Post-mortem investigations and examinations of tissues removed in the course of operation have also furnished evidence of the frequency of past or active infection: but, again, the separation of those in which it is active has often been very loosely made. The statistics of different observers are markedly dissimilar. Of 125 autopsies at the Foundling Hospital, New York, the bronchial glands were infected in every case. On the other hand, Gaffky and Rothe, of the Berlin Institute of Infectious Diseases, report that by inoculation from the bronchial and mesenteric glands of 400 children into guinea-pigs, tuberculous infection resulted in only 78 cases. More recently Eastwood and Griffiths, on behalf of the Local Government Board, inves-

tigated post mortem 195 children between the ages of two and ten, who had died from a variety of diseases. Of these, 118, or 60.5 per cent, showed evidence of tuberculous infection. Of the 118, 92 showed tuberculous lesions verified by subsequent culture of the bacilli, and in 6 bacilli were cultivated although no lesion was present. In 20, however, although tuberculous lesions were present, the bacilli were apparently dead. The inoculation method, unfortunately, has not been invariably employed, and the diagnosis of active tuberculosis is founded on the macroscopical examination of the glands and the discovery of giant-cell systems, which in themselves are evidence of resistance to the disease, and not of its activity. McLellan regards the glands as a trap for the bacilli, and thinks that it is only when they fail that other organs, such as the lungs, become affected. Primary affection of the lungs he considers a rare occurrence; and infection of the lungs, whether primary or secondary, as steadily progressive to a fatal termination. Of 162 children under the age of fifteen, referred to the Liverpool Chest Hospital with a diagnosis of phthisis, he was able to make out signs of glandular mediastinal enlargement, probably tuberculous, in 41. He had been able to follow up the majority. In many instances, within one month, the child had appeared completely free from the accompanying catarrhal symptoms which had given rise to the diagnosis of pulmonary tuberculosis. Such a result means either that pulmonary tuberculosis is a very curable disease, or that the diagnosis is generally made on inadequate grounds. McLellan inclines to the second explanation. Another difficulty in estimating the frequency of pulmonary tuberculosis is found, he thinks, in the much greater prevalence of fibroid pneumonic and bronchitic conditions than is generally supposed.

The same difficulty of distinguishing between active and latent tuberculosis is recognized by W. C. Bailey.² He holds that of all the new cases of pulmonary tuberculosis occurring in adults or youths, the great majority represent infections in childhood from some open case in the household, or from milk, and that for every developed case there are three others in whom the infection was overcome. The distinction should be made very clearly between the diagnosis of infection and that of disease. He recommends the following procedure: To inquire very carefully as to the presence of an infecting case in the family, and, if one is found, make a provisional diagnosis of infection. Then try the von Pirquet test, and if that is positive, make a physical examination for signs of intrathoracic or abdominal tuberculosis, to determine whether the case is one of infection or disease. If signs of mediastinal gland infection be elicited, but none of active disease in the lung or abdomen, the findings should be explained to the family, the case reported to the proper authorities, and the child given special hygienic care at an out-door school. If active disease be found, treat in a sanatorium or an out-door school. In the event of a negative von Pirquet test with a history of contact, keep the child

on the 'suspicious' list, place him in an out-door school if possible, and repeat the test at appropriate intervals. If there be no history of contact and nothing be found on examination, but a positive von Pirquet be obtained, the procedure should be similar to that in the last case, repeatedly making a physical examination for the purpose of detecting the active case. [This writer does not mention symptoms as an index of activity.—F. L.]

R. M. Smith³ writes in a similar vein. He thinks that about one case out of every four occurring in infancy or early childhood is acquired from tuberculosis in cows. Of greater importance, however, is the infection which follows exposure to persons ill with tuberculosis. It is important to make clear the distinction between tuberculous infection and tuberculous disease; the former, if inactive, is not a source of immediate danger either to the individual or to the community; the latter means active tuberculosis, and in children usually starts as a glandular disease, but may extend beyond its original confines, and then shows little tendency to further localization.

Early Pulmonary Tuberculosis.—Kenneth Fraser¹ has analyzed the results of an investigation of 296 cases of pulmonary tuberculosis among school children attending elementary schools in the county of Cumberland. The condition was diagnosed in 0·8 per cent of the children, and occurred with nearly equal frequency among boys and girls, and among those in the country and those in the towns. Between the ages of five and six, i.e. during the twelve months when most children begin school life, the number of cases detected increased from 19 to 37, an increase which constituted, according to Fraser, a serious indictment of the influence of school life on children predisposed to tuberculosis. Of the total number, 68 were above the average weight, 30 were of average weight, whilst 176 were below that standard. The parents had noticed loss of weight in only 61, a discrepancy probably explained by the fact that the children had been habitually poorly nourished, or, in other words, had failed to increase adequately in weight, rather than lost weight. The fallibility of weight alone as a guide was demonstrated by the good weights of several children who suffered from serious lesions. Such manifestations of impaired nutrition as pallor, anæmia, systolic cardiac bruits, general lassitude, complaints of being 'easily tired,' loss of appetite, gastric disturbance, and headaches, were present in at least 40 per cent of the cases. Defective nutrition, Fraser holds, is probably the first visible sign of tuberculous infection, the primary lesion in the bronchial glands being situated too deeply to be recognized clinically. He attaches great importance to 'heavy' night sweats, a history of which was obtained in 10·2 per cent. In 43·3 per cent the child was said to be troubled with a cough; the short, sharp cough, with gradual onset, seemed to be the variety most suggestive of incipient phthisis. With regard to the site of the first lesion recognizable clinically, in only one case was neither apex affected, and the apices of both lungs were involved in 76·8 per cent;

it was more advanced at the right apex in 16 per cent, and at the left in 0.9 per cent. In 95.3 per cent more or less dullness was present, and was therefore of first importance in the early diagnosis. It was difficult to estimate the value of adventitious sounds, in the absence of regular and frequent re-examinations. Coarse crepitations and rhonchi were of little importance, but friction gave a clearer indication. Fine crepitations presented the chief difficulty; if persistent they were also certainly a sign of a tuberculous lesion, and if localized were always suspicious, especially if at one apex. Inequality of the breath sounds between corresponding areas of lungs was found much less frequently than might have been expected from the records of other observers. In the great majority bronchial breathing was found. This was probably attributable to the great persistence of bronchial breathing, inequality of breath-sounds being relatively transitory. Two hundred and fourteen re-examinations were made; these seemed to show that spontaneous improvement occurred more frequently in girls than in boys, and more readily after six years of age, and in the country than in the towns. The disease advanced more quickly in the urban children, 29 per cent being worse, as compared with 16.9 per cent among country children.

Tuberculosis of Intrathoracic Glands.—Walker Overend⁵ discusses pulmonary tuberculosis as it occurs in children between the ages of five and fifteen, when, in his opinion, the tuberculous process tends to become localized within the ducts and glands of the lymphatic system of the respiratory organs. He regards the respiratory tract as the chief portal of entry, dissemination taking place *gradatim* from one gland to the next. After ingestion of tuberculous food, the mesenteric glands may be attacked; after infection of the mouth, throat, and tonsils, the cervical; after abrasion of the limbs, the axillary and inguinal. Mesenteric infection, under ordinary circumstances, can only affect the bronchial glands indirectly, by way of the thoracic duct and pulmonary artery. Gohn has described foci in the lungs, which he regards as antecedent to the lesion in the bronchial glands; but Overend holds that these foci are not necessarily primary, but may be due to conduction along other lines of transportation. By direct continuity from a tracheobronchial or bifurcation gland an infection may pass directly to one of the lobes of the lung, and induce the formation of a pulmonary focus. Gohn's investigations really afford a third method of dissemination by the proof of the very common occurrence of an extensive tuberculous pleurisy, particularly affecting the upper lobes, the hilum, and the base.

When the intrathoracic glands become tuberculous, there are several possibilities: (1) The glands may caseate, calcify, and, becoming surrounded by periadenitis, the process may be arrested and completely healed. (2) The bacilli may escape through the capsule of the gland, and induce a slow infiltration in the middle and lower lobes (caseous pneumonia). From one of the right tracheobronchial glands the caseous process may pass directly to the adjacent pleura.

and spread into the right lung towards the apex, as Still has shown. No doubt the infection may also spread to the bronchial glands by continuity. (3) Irruption may occur into the bronchus, and if this take place before the first division, the caseous débris may be discharged into one lobe only, setting up an acute tuberculous process, sometimes with rapid excavation. (4) Irruption into a blood-vessel may follow. If into an artery, a localized miliary tuberculosis, corresponding to its supply, may be caused; if into a vein, a wider dissemination takes place. (5) There may be lymphatic dissemination, the infection spreading centrifugally along the lymphatic sheaths of the vessels and bronchi to distal parts of the lungs, inducing a thickening and thrombosis in its course.

The clinical symptoms and signs are obscure at first, the toxæmia producing debility, disinclination for exercise, loss of appetite and weight, anæmia, and myoidema. Such children are said to 'catch cold' easily, and often suffer from 'bronchitis.' There may be swelling of the cervical, axillary, mesenteric, and inguinal glands. Pain, difficult of localization, within the chest, may be complained of on deep inspiration and vigorous exercise. Signs of pressure are not obvious in early cases. Congestion of veins over the chest and upper three or four dorsal spines is usually present. Tenderness over the dorsal spines (first to eighth) may be elicited by firm pressure; it is probably referred and produced by irritation of the mediastinal nerves by the enlarged glands. Noeggerath and Salle found hyperalgesia in the regions of the fourth cervical and second and third dorsal sensory areas. There may also be tenderness on pressure in the interspaces.

Cough is often absent, or present only at night; it may be intermittent and paroxysmal. There is no sputum. There may be dyspnoea and asthmatic attacks at night. The temperature may be normal, and is often subnormal, with occasional fluctuations to 100°. Night sweats may occur. The heart may be slow, but more often is rapid.

Briefly, the signs as described by Riviere are, impairment to light percussion at one apex, often the right, in front and behind: sometimes dullness over the manubrium and the interscapular region: and an oval interspinous area of dullness about the fifth and sixth dorsal spines. Auscultatory changes are harshness of breath-sounds over the apices, with a prolonged expiration and increased vocal resonance; sometimes weak inspiration over the rest of the lung; vertebral bronchophony with whispering echo on repeating the number 33 as far down as the fourth and fifth dorsal spines or even lower: occasionally fine crepitations at the apex and within the middle and lower lobes, possibly produced by slight œdema resulting from lymphatic and venous engorgement.

A radiogram may show: (1) A fine shadow outside the sternum, sometimes on both sides, due to enlargement of the tracheobronchial glands; (2) A shadow just below the level of the vertebral end of

the sixth rib, running directly into the hilum and obliterating the narrow isthmus which often intervenes between the hilum and the cardiac opacity, due to the bifurcation glands; (3) A veiling or dimness in the first, second, and third interspaces, suggesting either a close interlacement of lymphatics or a fine uniform but intangible pleuritic shadow; (4) Swelling, caseation, or calcification of the hilus glands, the density of the shadows increasing in this order. The hilum opacity is abnormally broad, dark, and contains a number of circumscribed shadows. If the hilum is broad, irregular in outline, and uniformly diffuse or cloudy, the process is active: the branches running to the diaphragm should be carefully followed for any signs of tubercles or localized patches of tuberculous bronchopneumonia; (5) Calcification of the sternal ends of the ribs, especially of the first. If, in a young subject, the edges are sharply cut, and there is some evidence of calcification of the first rib cartilage, the prognosis is more favourable. Narrowing of the intercostal spaces on one side should be looked for at the same time. (6) The heart in older children may appear pendulous and smaller than normal; (7) Striæ, networks, and small tubercles or tuberculous foci may be seen in the pulmonary fields. The coarser the interlacements, the more suggestive is the picture of an arrested lesion (Boardman). Small pin-head foci, separated or in conglomerate groups, producing a cloud effect, is diagnostic of activity (Rieder, Morton). If they become fibrosed, the opacities will be denser and more sharply defined.

H. F. Stoll and A. F. Heublein⁶ take a similar view of the frequency and importance of tuberculosis of the bronchial glands, and quote Comby, who found these glands affected in each of 569 cases of tuberculosis; and Hamburger, whose experience was similar in 110 cases. Their description of the early symptoms follows fairly closely that of Overend. They record that Philippi found hyperchlorhydria to be somewhat common. The attacks of dyspnœa are at first either chiefly or wholly expiratory in character, but later the dyspnœa becomes both inspiratory and expiratory; thus laryngeal diphtheria has been diagnosed and intubation performed without giving relief. The voice persists, however, in contradistinction to its abolition in diphtheria. Very alarming symptoms may follow rupture of a caseous gland into the trachea or a bronchus. The child, formerly in apparently good health, may be seized suddenly with extreme dyspnœa, and death may supervene rapidly. Records of several such cases have recently been collected by Goodman. Perforation of the œsophagus has also occurred, and death has immediately followed erosion of one of the large blood-vessels. Rupture of a vessel distended by pressure of the enlarged glands may explain some of the cases of hæmoptysis, when no other cause is discovered.

These authors lay some stress on diminution of expansion of one apex as a physical sign of the condition. If the breath be held at the end of inspiration, and one observes the hilus region (comprising anteriorly that part of the upper two interspaces between the midclavi-

cular and parasternal lines), an apparent retraction may frequently be noted on one or both sides. This 'dimpling' of the hilus region with inspiration is best seen when the patient is seated in a slanting light, and is usually greatest in the second interspace (*Fig. 51*). When the hilus disease is of long standing, and cicatrization had taken place, this depression is well marked and constant. The intercostal muscles over the hilus are occasionally rigid, but Stoll and Heublein do not ascribe to this sign so much importance as does Pottinger. They attach much value to light and very light percussion of the upper two interspaces in the parasternal line, and more especially to paravertebral percussion at the end of expiration. Dullness is most commonly met with at the sides of the fourth and fifth thoracic

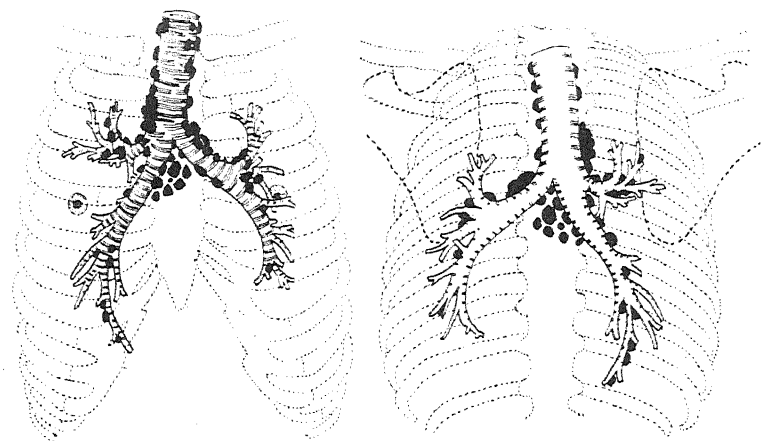


Fig. 51.—Composite drawings showing the relationship of the bronchial glands to the thoracic wall in the adult. The glands are according to Sukienikow (*Berl. klin. Woch.*, 1903, xi, 316, 347, 369), and the trachea and bronchi are after Blake (*Amer. Jour. Med. Sci.*, 1899, cxvii, 320). In the child the trachea bifurcates at about the level of the intervertebral disc between the fourth and fifth thoracic vertebrae, which corresponds nearly to the tip of the fourth thoracic spine. This is about opposite the articulation of the third costal cartilage anteriorly.

vertebræ, more often on the right side than the left; it increases at the end of expiration. Diminution of the respiratory murmur they met with only twice; but harsh inspiration, often cogwheel in type, appeared of more significance. Fine crepitations in the region of the nipple, persisting in spite of deep breathing, was noted in a considerable number of cases, as was also accentuation of the aortic second sound. They agree with D'Espine as to the value of the alteration of the whispered voice sounds. When the patient whispers 'three thirty-three' the final 'e' of the last word has an echoing quality, and persists for a moment after speech has ceased. Normally, the tracheal quality of the whispered voice does not extend below the seventh cervical spine in children; when it is heard over the upper thoracic vertebrae it indicates bronchial adenopathy. The sound is

heard anteriorly less frequently, but may occasionally be detected over a considerable part of the sternum or along its border, and in the anterior axillary line just under the lower edge of the pectoralis major.

They regard *radiography*, especially stereoradiography, as of the utmost value, since it shows the exact location and extent of the morbid process, and is the greatest stimulus to careful clinical work.

On the other hand, W. J. Dodd⁷ holds that other conditions besides tuberculosis will reveal *x-ray* evidence of enlarged hilus and bronchial glands, and emphasizes the need of a complete examination before the diagnosis of tuberculosis is made. He cites a series of 100 cases investigated by R. M. Smith. In only 9 was there any sign of active tuberculosis, yet 89 showed some pathological lesion, usually enlarged hilus and peribronchial glands, in the Röntgen picture. He is not convinced that such glands should be called tuberculous after *x-ray* examination, unless these are calcified. Repeated radiograms frequently show that the lesion clears up in the way we should not expect were it tuberculous. R. M. Smith⁸ regards D'Espine's sign and radiograms as the most important indication of tuberculosis of the intrathoracic glands.

E. Rizt⁹ writes of the great difference of the reaction of the intrathoracic glands to tuberculosis in children and in adults. In the latter little or no caseation is found, follicular formations are rare and incomplete, and fibrosclerotic changes are absent. He thinks this difference cannot be ascribed to blockage of the lymphatic channels in the lungs, for the argument would not hold for the acute form of pulmonary tuberculosis, in which no such obstruction occurs; nor can it be due to an inability on the part of the lymphatic tissues to react, since in processes other than tuberculosis there is no failure to react, e.g. they become cancerous in cancerous conditions of the lung. He therefore adopts von Pirquet's view of 'allergy.' In his view caseation of the glands is not a specific character of childhood, but of primary tuberculous infection. In adults the absence of caseation of the corresponding glands is not because they are essentially and physiologically different from those of childhood, but because pulmonary tuberculosis of the adult is due to reinfection.

TREATMENT.—Overend¹⁰ recommends that if there is the slightest doubt, all hygienic measures, such as proper diet, graduated exercise, sea air or sanatorium, open-air school, or entire freedom from the routine of school, for several months, should be adopted. **Virol**, **Red Bone-marrow**, and **Cod-liver Oil** are said to increase the bactericidal powers of the blood. **Ichthyol** and **Calcium Sulphide** are believed to hasten the fibrotic changes; **Iron** is useful to improve the erythrocytes. He suggests the employment of **X Rays**, using a hard tube and filters, and treating a circular area around the spine of the fourth dorsal vertebra. Stoll and Heublein¹¹ have found some value in **Tuberculin** treatment. They believe that with a more general adoption of one of the methods by which the thoracic cavity may be

explored with impunity, operative relief will become the rule for those children in which there is gradually increasing dyspnœa.

Tuberculosis of Mesenteric and Retroperitoneal Glands.—E. H. Risley¹² refers to a not uncommon group of cases, examples of which present a definite clinical picture of an acute condition in the right lower quadrant of the abdomen, often simulating appendicitis. Operation reveals masses of retroperitoneal glands in various stages of enlargement, but no other focus of tuberculosis can be detected elsewhere in the body. These isolated glands or groups of glands may occur anywhere in the mesentery, but are usually found in the ileo-cæcal region. He disagrees with Corner, who believes that tuberculous mesenteric glands are to be found in practically every child in whom an abdominal operation is necessary, and thinks that so frequent an enlargement must be due to mesenteric adenitis, since recovery without further symptoms is customary.

According to Risley, the chief features of tuberculous glands in this position are: (1) They are very common in infancy and childhood, but are not confined to this period; (2) There is no difference in type assignable to age, as Corner maintains; (3) Two clinical varieties are noticeable, one with distinct palpable masses of glands accompanied by no or only very vague symptoms, and the other with alarming abdominal symptoms and signs developing suddenly, the glands being impalpable.

DIAGNOSIS.—This is often difficult or impossible, and unless the glands are large enough to form distinct masses, there are usually no symptoms to suggest a tuberculous infection. Symptoms may be absent even with palpable glandular masses. When the glands are small, the condition may be discovered only by operation. There may be trivial symptoms, such as fleeting and slight right-sided or general abdominal pain, with or without disturbance of digestion and irregularity of the bowels, the general health being good, or the patient being merely somewhat delicate. In other cases there is more or less persistent local abdominal pain, with generally a 'soreness' referable to the cæcal region. In such, physical examination may or may not reveal resistance or an ill-defined glandular mass. In yet others there may be general, and afterwards local abdominal pain confined to the right lower quadrant, gradual or sudden in its onset, a rise of temperature, nausea and vomiting, constipation or diarrhœa, and, on examination, acute local tenderness with spasm and resistance, leucocytosis up to 12,000 or 15,000, and an appearance of serious illness. Intestinal obstruction may be simulated. The glandular enlargement sometimes precedes a general tuberculous peritonitis, and may be cured by operation. The record of 65 cases where tuberculous mesenteric glands had been found after death were investigated, and in no instance was there any suggestive symptom in the past history. Risley infers that a great many people harbour such glands in various stages of activity without experiencing symptoms.

The prognosis in the subacute stage is good without operation. In

the acute stage exploratory laparotomy should be done, but the glands should not be removed unless there are definite indications, such as the presence of adhesions or ulceration, or a large mass producing pain or mechanical obstruction.

Tuberculous Cervical Glands.—A. S. Griffith¹² has investigated bacteriologically, lymphatic glands considered to be tuberculous, and obtained by surgical operation. In a few instances pus from an abscess or curettings from a tuberculous sinus on the neck provided the material for examination. In all but three instances the glands were cervical. The cases investigated numbered 110, and they could be divided into three groups, comprising respectively those of 10, 29, and 71 individuals. In the first group the 10 sets of lymphatic glands were not tuberculous macroscopically, and did not produce tuberculosis in guinea-pigs. Microscopical examination of 5 and cultural experiments with 4 yielded negative results. The 29 lymphatic glands in the second group also failed to produce tuberculosis in guinea-pigs; they were, however, definitely tuberculous to the naked eye. In 15 cases tubercle bacilli were found, and in 7 of these were numerous or moderately numerous, and were short and well stained. Cultural experiments showed that in no instance were the bacilli living. This group afforded clear evidence that in glandular tuberculosis there is a marked tendency to spontaneous cure. In the 71 cases comprised in the third group, the original material produced tuberculosis in guinea-pigs, and cultures were obtained. Altogether 98 strains were isolated. From 37 of the 71 cases human tubercle bacilli were obtained, and from the remaining 34 bovine bacilli. None of the 71 viruses, whether of human or of bovine type, showed any evidence of attenuation. Careful examination failed to reveal any macroscopic character peculiar to one type of infection. On the other hand, microscopic examination sometimes yielded some indication. Numerous short well-stained bacilli suggested a bovine infection. The proportion of bovine infections of cervical glands was highest in children under five years, and lower in adult life, though their incidence in adults was not unimportant. The proportion of persons infected by this type in London and the London district, and in the rest of England, was much the same, but in Scotland it was much higher. When compared with other published statistics it appears that bovine infection in England, though less than in Scotland, is higher than in America and Germany.

A. Philp Mitchell¹⁴ has continued his study of the bacteriology of tuberculous cervical glands, and has extended it to include a similar investigation of other lymphatic glands. When the material was obtained post mortem, cultures were grown from 12 of the 29 cases; 8 yielded human tubercle bacilli, and 4 bovine. Of the bovine cases, 3 children died from tuberculous meningitis, the other from a non-tuberculous condition. In all four the mesenteric glands were more extensively affected than any other group of glands. Of the 8 from which the human bacillus was grown, 7 were tuberculous, the other

apparently non-tuberculous. In 6 the tuberculosis was most advanced in the bronchial glands, in the remainder it was equally severe in bronchial and mesenteric glands. The human bacillus was also demonstrated in one of 18 cases in which no visible lesions of tuberculosis were present. Of cervical glands removed by operation, 80 have been investigated by Mitchell; of these, 71 were instances of bovine and 9 of human infection. All were cases of children of twelve years old or under, the greatest incidence being during the second year of life. Eighty-four per cent of the children aged two years and under had been fed on unsterilized cow's milk since birth. Amongst the children harbouring the human bacillus the opportunity for human infection could generally be established. In not one of the bovine cases was there a history of pulmonary tuberculosis in other members of the family. In 16 cases, however, one or more of the family were affected with surgical tuberculosis. Of 8 cases of primary abdominal tubercle, 7 proved to be of bovine origin. Since all these cases occurred in Edinburgh and the neighbourhood, an inquiry was made into the milk supply, and of 406 samples of mixed milk 82 contained tubercle bacilli. The results of the investigation showed that while infection with the human form of bacilli is the main contribution to the mortality-rate, yet bovine tuberculosis can no longer be regarded as a negligible factor in respect to the incidence of tuberculosis amongst children. They afford a strong argument for a 'pure milk' legislation.

TREATMENT.—R. T. Morris¹⁵ describes various forms of non-operative treatment which he has employed for tuberculous glands of the neck. The first consists in injecting a 7 per cent solution of **Iodoform** in oil. From one to three minims of this solution were injected into each of the larger glands at a sitting, sometimes preceded by injecting a little cocaine. The usual hygienic and medical means were also employed. The results were surprisingly good. The injections were made every three or four days. Since the younger patients resisted this treatment, **Local Hyperæmia** was tried with equal success. It was obtained by placing alternately, first a hot-water bottle and then an ice-bag against the neck, for a few minutes each, an hour at a time once or twice a day, the patient being in a reclining position. The length of time and the amount of attention required were the only objectionable features. The **High-frequency Current** or the new **High-penetrating X-Ray** treatment overcame these difficulties and was very effective, but introduced the feature of expense. More recently he has added to the other resources **Tuberculin** injections, and writes strongly in their favour.

Tuberculosis in Infancy.—Von Pirquet¹⁶ has, during the last ten years, been paying special attention in Vienna to tuberculosis as it affects infants. In all of 131 cases the bacilli apparently entered the body through the respiratory organs, and caused the first lesion in the lungs. He favours entirely the views of Kuss, Albrecht, and Ghon, that the lung and not the glands is the first site of infection.

There is no evidence, in his opinion, of germinal transmission, but he is convinced of the reality of placentogenous infection, and thinks that infection from aspiration of the liquor amnii may also occur. Fœtal transmission, in any case, he regards as very rare, only about thirty certain cases having been collected from the literature by Cornet. In placentogenous infection the disease is most advanced in the lymphatic nodules of the liver and adjacent parts. Clinically, the

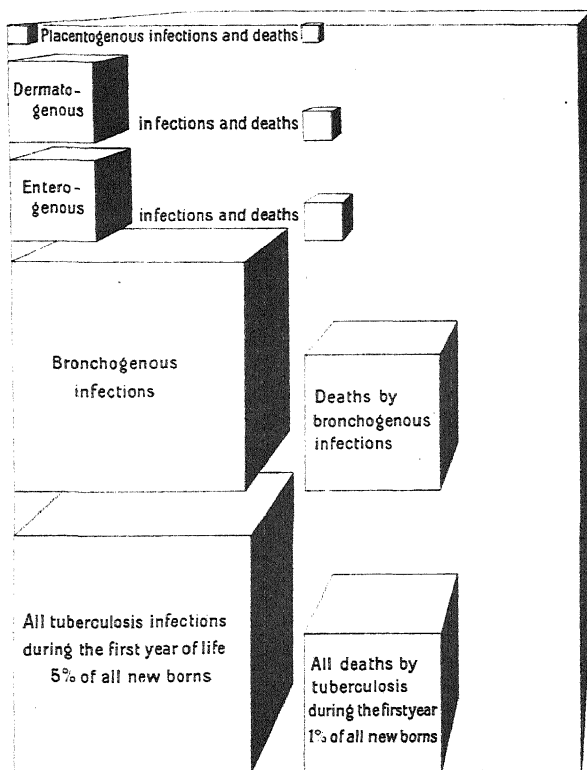


Fig. 52.—Incidence and mortality from tuberculosis in infants. Diagram showing approximate proportions of different channels of infection among the infants of Vienna.

infants are below normal weight at birth, waste rapidly, develop fever, meteorism, and some tuberculides on the skin, whereas the lungs are free from morbid signs. The prognosis is hopeless, and diagnosis can only be made by post-mortem examination. In the first days of life, infection may occur from inhalation of the bacilli from the parents or midwife, or from infection of the skin by the ritual of circumcision. Of the latter, 42 cases have been reported by Holt, 16 of which were known to have ended fatally, and 6 in

recovery. Bronchogenous infection in the first days of life seems invariably fatal. After the first week, and during the first year, many infections occur, most apparently bronchogenous. He is no believer in frequent intestinal infection, and regards proved infections by the bowel as rare. This may in part be due to the fact that in Vienna the milk is usually boiled. The nose, the mucous membrane of the mouth, and the tonsils, he regards also as very rarely the portals of entry. In Vienna about 1 per cent of all infants die of tuberculosis in the first years of life; in London about half as many. (See Fig. 52.)

The Tuberculin Skin Reaction.—O. F. Rogers¹⁷ summarizes his conclusions of the value of v. Pirquet's test, arrived at by following the cases of 50 children under 3 years of age who gave a positive reaction. Before the age of 2 a positive reaction seems to be an indication that the child's life is likely to be short. The mortality among all children up to the age of 10 who react to the test is much higher than that of normal children.

REFERENCES.—¹*Liverp. Med.-Chir. Jour.* 1914, 333; ²*Boston Med. and Surg. Jour.* 1914, ii, 452; ³*Ibid.* 454; ⁴*Brit. Jour. Tubercul.* 1915, 1; ⁵*Brit. Med. Jour.* 1914, ii, 1009; ⁶*Amer. Jour. Med. Sci.* 1914, ii, 369; ⁷*Boston Med. and Surg. Jour.* 1914, ii, 453; ⁸*Ibid.* 454; ⁹*Edin. Med. Jour.* 1915, ii, 215; ¹⁰*Loc. cit.*; ¹¹*Loc. cit.*; ¹²*Boston Med. and Surg. Jour.* 1915, i, 253; ¹³*Lancet*, 1915, i, 1215; ¹⁴*Edin. Med. Jour.* 1914, ii, 209; ¹⁵*N. Y. Med. Jour.* 1914, ii, 657; ¹⁶*Edin. Med. Jour.* 1914, ii, 220; ¹⁷*Boston Med. and Surg. Jour.* 1915, i, 161.

TUBERCULOSIS, SURGICAL. (Vol. 1915, p. 642.)

TUBERCULOSIS, URINARY. J. W. Thomson Walker, M.B., F.R.C.S.

The ultimate results of genital tuberculosis in the male are discussed by Barney.¹ An analysis of 153 cases of epididymal tuberculosis seen at the Massachusetts General Hospital is given, and the following are some of the conclusions. Tuberculosis of the genital tract is accompanied by old or actual lesions of other organs in more than 55 per cent of cases, the lung being the most frequent seat of disease. The genital tract is usually first attacked in cases of genito-urinary tuberculosis. Over 27 per cent of 113 patients traced have died of some form of tuberculosis. Within a period of six years after operation, 41 per cent of 58 cases died of this disease. Miliary, renal, and lung tuberculosis are, in order, the final stages of the disease. The writer concludes that until at least ten years have elapsed after operation, no patient can be said to be cured of tuberculosis. The records of those now living show a much smaller percentage than do those of the dead, of other tuberculous processes before operation, but many of them have since developed other foci. While genital tuberculosis, even if unilateral, results in sterility in most cases, neither the disease nor the operation for its relief, including double orchidectomy, seems to impair masculinity in any way. In no case of epididymectomy did the patient return for a subsequent orchidectomy. Although the prostate and seminal vesicles are involved in most cases of epididymal tuberculosis, their condition will improve

or heal after removal of the epididymis. Radical surgical treatment of these organs is unnecessary and unwise. The long life and good general condition of many patients, even although suffering from repeated outbreaks of tuberculosis, show that the survival of the patient depends largely on his ability to immunize himself to the disease. To assist this, good hygiene, sandalwood oil, and tuberculin are essential.

Brown² discusses the significance of tubercle bacilli in the urine. No staining method, he holds, differentiates tubercle bacilli from smegma bacilli, but cultural methods may be of great assistance. Animal inoculation, with the production of tuberculosis, is an absolute test, but of value only when positive. Tubercle bacilli can be excreted through apparently normal kidneys. Radiography may aid in the detection of caseous foci when the urine contains no tubercle bacilli. Spontaneous healing is often fictitious. The final and often the best treatment on diagnosis for renal tuberculosis is nephrectomy followed by tuberculin. Tubercle bacilli occur in the urine in genital tuberculosis usually late in the disease, and are consequently of little aid in diagnosis of the condition.

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1914, ii, 2274; ²*Ibid.* 1915, i, 886.

TYPHOID FEVER. (See also PARATYPHOID FEVER.)

E. W. Goodall, M.D.

ETIOLOGY.—An extremely interesting statement¹ has recently been published, showing the reduction in the typhoid death-rates in most of the large cities of the United States during recent years. It is gratifying to know that in most of them there has been a substantial reduction, for in the case of typhoid a reduced death-rate may safely be taken to represent a reduced morbidity-rate. The reduction, at any rate the bulk of it, is ascribed to dealing with polluted water supplies, either by introducing a new, pure supply, or by filtering or treating chemically (with hypochlorite of lime) the one previously existing. For details the reader is referred to the original article.

A noteworthy epidemic which occurred in March and April, 1914, at Hanford, Cal., U.S.A., has been reported by W. A. Sawyer.² There were 93 cases in all, and they occurred amongst about 150 persons who partook of a certain public dinner on March 17. There were only 3 deaths, and the low case-mortality is attributed to the fact that a considerable number of the cases were mild, and would not have been diagnosed had not special inquiry been made. The incubation periods were as a rule short. The first case developed three days after the dinner, and the sixth day after the date of infection saw the greatest number of cases; 49 of the 93 had developed by the evening of the seventh day, and 64 before the tenth day. The last case developed on the twenty-ninth day. The certain cause of the epidemic was a chronic carrier, a woman, age 63, who had kept a boarding-house in Hanford. During the previous eight years four unexplained cases of typhoid had occurred in her house. At the

time of the Hanford epidemic she was found to have typhoid bacilli in her stools. So far as she knew, she had never had the disease herself; but she stated that thirty-five years previously her daughter had undergone an attack.

SYMPTOMS.—When any new method of treating typhoid fever is introduced, it is as often as not claimed that the course of the disease is cut short by it. It is therefore important to know whether typhoid ends by crisis naturally or under various non-specific forms of treatment. This mode of termination is certainly rare, but that it may occur occasionally, and, indeed, in some outbreaks and places more often than rarely is shown by E. J. Wood,³ who gives an account of 9 in a series of 200 cases of typhoid, or 4·5 per cent. In nearly all of the 9 cases the termination of the disease was by true crisis, that is, not only did the temperature fall very rapidly several degrees to normal, never to rise again, but there was at the same time a very marked improvement in the other symptoms. In some of the cases the patient was most seriously ill when the crisis occurred.

Adam Patrick⁴ draws attention to a condition which, he states, was first recognized by the late Sir William Gairdner, and termed by him 'doughy.' It is a slight superficial resistance over a part or the whole of the anterior abdominal wall, with increased superficial resistance in the right hypochondrium. It is due to slight increase in the tonic condition of the muscles of the abdominal wall, and while it is sometimes found over the whole anterior surface of the abdomen, it occurs more usually in a horizontal band with the upper border about 1 in. above, and its lower border 2 or 3 in. below, the level of the umbilicus. The cause of this condition is not apparent, nor is its significance. It is to be distinguished from the deeper and more marked resistance which is due to peritonitis.

DIAGNOSIS.—One of the surprises of the War, so far as typhoid fever is concerned, has been the occurrence, in considerable numbers, of cases of paratyphoid amongst the typhoid cases. The surprise would possibly not have been so great had paratyphoid B alone been found, as that variety is known to be present in Europe; but cases of paratyphoid A have also occurred, and in fair numbers. Up to the time of the War, this variety has been confined to India and other eastern countries. It can at present only be conjectured that it has been introduced into the war zone by some of the Indian troops, though the writer is not aware of any definite proof that this has happened. However, the presence of these two diseases has made the diagnosis of the fever cases, already rendered somewhat difficult by the fact of previous inoculation with typhoid vaccine, still more difficult. Of this the writer had personal experience in dealing with cases of 'typhoid' amongst French soldiers. And while the question of diagnosis is complicated, that of the specific treatment is still more so. A patient is admitted to hospital with symptoms of 'typhoid'—continuous pyrexia, rose-spots, diarrhoea, enlarged spleen, and so on. Is he suffering from infection by *B. typhosus*, *B. paratyphosus* A, or

B. paratyphosus *B.*, singly or in combination? If, as is often the case, he has been within a few weeks or months inoculated with *B. typhosus*, and a positive agglutination reaction is obtained with one or both of the paratyphoid bacilli, as well as with *B. typhosus*, it is not possible to pronounce immediately whether he has or has not been infected with the typhoid bacillus: and it becomes very difficult to decide, if it is a question of specific treatment, which bacillus to employ. Unfortunately, the only certain method of diagnosis, i.e., blood-culture, takes time, is not always to be carried out, even in base hospitals, and may, especially when the illness is at all advanced, prove of no value because of a negative result. Hence any device which enables the observer to arrive at a correct diagnosis at an early period is to be welcomed. The question has been attacked by G. Dreyer, F. W. Ainley Walker, and A. G. Gibson,⁵ applying the agglutination test in a systematic manner. According to them, "accurate differential diagnosis can only be obtained by routine testing of the serum of the patient against the three micro-organisms, *B. typhosus* and *B. paratyphosus* *A* and *B*, in parallel series of observations, and by always determining the *maximum* dilution of the serum in which agglutination takes place. Individuals who have been inoculated with antityphoid vaccine within a period of some months or even years, will give a high agglutination titre against *B. typhosus*. Whether they are suffering from active typhoid infection or not can only be determined by repeating the agglutination test at intervals in order to ascertain whether the titre of agglutination shows marked changes or remains practically constant. Such changes are in any case of greater importance in the diagnosis than is the absolute degree of agglutination. They can only be detected with certainty by making use of a standard culture of killed typhoid bacilli and employing the macroscopic method of determination, which is both simple and more reliable than the microscopic." [The authors do not explain why the macroscopic is better than the microscopic method; it is doubtful whether a majority of bacteriologists would agree with them; see, for instance, the reference⁶ below.—E. W. G.]. The advantages of a standard culture are as follows: (1) It is sterile; (2) It is as sensitive to agglutination as a fresh culture; (3) It keeps unchanged almost indefinitely if kept in a cool, dark place; (4) It renders all observations strictly comparable.

The authors describe in detail the preparation of the standard culture, and the method of carrying out the parallel experiments simultaneously with the patient's serum against *B. typhosus* and *B. paratyphosus* *A* and *B*. The tests should be carried out every few days. Charts are given showing the changes in the agglutination titre during various periods. As a result of experience, the authors feel that they are justified in making the following statements: "(1) That bacillus which exhibits the greatest agglutinability (highest agglutination titre) is the infective agent (or the principal infective agent) in the case under examination. (2) If the case is one in

which the agglutination of a second micro-organism is due to the presence of *co-agglutinins*, the curve of co-agglutination will be found to run parallel to the curve of principal agglutination, but at a lower level. (3) If the case is one of mixed infection with two different organisms, their respective curves of agglutination are not parallel, but exhibit totally independent courses, which may even cross one another."

A table is given which shows the results of the agglutination tests in twenty cases. The authors make the statements: (1) That no case of typhoid fever has been found amongst the inoculated; (2) That of six of the paratyphoid cases, three occurred in inoculated subjects, and, without careful serum tests, might have been put down as cases of typhoid amongst the inoculated; (3) That so far as the limited series of cases goes, paratyphoid occurs with equal frequency amongst the inoculated (antityphoid) and non-inoculated subjects; (4) That in no case other than that of active paratyphoid infection has the patient's serum agglutinated *B. paratyphosus A* or *B* in a dilution of 1-25, even when the titre of the typhoid agglutination was very high; and (5) That the typhoid agglutination found in convalescents from typhoid fever is easily distinguishable from that of inoculated individuals: it is of low titre as compared with theirs, and always shows some diminution of titre in the course of a week or two, while in that of inoculated persons, whose titre has by lapse of time fallen to a similarly low level, no change will be found within the same period.

Other views on this question of the diagnosis of typhoid fever and paratyphoid A and B, in both inoculated and non-inoculated men, will be found in a paper by Bernard and Paraf.⁶ They conclude (after making observations on 500 cases) that the serum reactions are very misleading in these mixed infections, especially in the vaccinated, and further that the only test which can be relied upon is blood-culture. They are of the opinion that the macroscopic method of doing a serum reaction is not so trustworthy as the microscopic.

Dawson⁷ states that some observations made whilst working with a certain strain of *B. enteritidis* (7160) suggested that this bacillus might be of use in the diagnosis of typhoid. Accordingly he made further investigations, and found that a positive reaction with *B. enteritidis* (7160) is due to something more than previous antityphoid inoculation, and hesitation in diagnosing typhoid (or paratyphoid) should be occasioned only by the necessity of excluding infection with the *B. enteritidis* itself. The symptoms associated with the *B. enteritidis* infection are, however, generally clear enough to make the distinction easy. A single negative test with *B. enteritidis* (7160) does not exclude a diagnosis of typhoid fever, though, if obtained late in the course of an illness, it would constitute good evidence against typhoid infection. Repeated negative tests are much more conclusive, and should be of value in deciding the nature of doubtful cases. The time required, however, is a hindrance to rapid diagnosis, which is absent in the case of a positive reaction.

Wille⁸ gives an account of sixteen cases in which he states that he found bacilli, presumably typhoid, in the blood of patients by direct microscopical examination. Most of the patients had suffered from an attack of the fever some months or weeks previously, but had never quite recovered. The blood was examined under a cover-glass. At the end of half an hour or so the bacilli usually became agglutinated. The serum reactions, with typhoid bacilli, were positive. [In view of the fact that most bacteriologists state that the bacilli are not very numerous in the blood in typhoid fever, and that they occur in maximum numbers early in the disease, disappearing altogether later on, these observations are very interesting, but appear to require confirmation.—E. W. G.]

It would seem that other organisms besides the *B. typhosus* and *B. paratyphosus* A and B can give rise to symptoms which clinically are not to be distinguished from typhoid fever. Loeper and Bergeron⁹ have published the notes of a case in which a soldier, age 26, was admitted to hospital with fever, diarrhoea, colic, nausea, and general weakness; but there was no headache. The spleen was enlarged, and there were signs of diffuse bronchopneumonia. On the thirteenth day rose-spots were noticed on the skin of the abdomen, and they persisted for several days, though there were never more than five of them. The serum reactions were negative in respect of paratyphoid A and B and also typhoid, even though the patient had been inoculated previously. Two blood-cultures made on the thirteenth and nineteenth days respectively gave pure culture of *Micrococcus tetragenus citreus* (*tétragène citrin*). The organism was not pathogenic to mice, but the complement-deviation test was positive with it and the patient's blood. As the patient was not progressing favourably under ordinary treatment, an intravenous injection of **Electrargol** (colloidal silver) 5 c.c. was given on the nineteenth and twenty-fourth days; the patient improved so rapidly after these that the authors recommend a trial of the remedy in similar cases.

TREATMENT.—The occurrence last winter (1914–15) of a considerable number of cases of typhoid fever in the English, French, and Belgian armies, has afforded the physicians of those nations opportunities of testing to a certain extent the value of treatment with specific **Vaccine**, a method which has of recent years been put into practice more extensively in the United States of America than in any other country, because of the wider prevalence of typhoid fever there. In a discussion¹⁰ at Rouen, on Feb. 13, 1915, several British physicians related their experience of the treatment. Dawson's view was that it was valuable if used with caution; that it should be begun early and larger doses of vaccine should be employed than it was customary to administer—750 million bacilli, rather than the usual 200 million. He believed that the use of the larger dose was preferable because of the hope that the disease might be overtaken, and he stated that no harm would result from these large doses. He recommended the heterogenous army vaccine, and he objected

to the use of autogenous vaccines, because they might not possess the same immunizing power as a heterogenous preparation of proved value. Leishman is reported to have said that nothing was harder to answer than whether vaccine treatment in typhoid was a success or not. Wiltshire was of the opinion that the time for vaccine treatment was undoubtedly the first fortnight. The doses in his cases had been 125 million increasing up to 500 million, and no ill-effects had resulted from the larger doses. Smallman stated that the value of the treatment had been amply proved by the figures given during the discussion. Unfortunately the report did not state the figures in sufficient detail for the reader to judge for himself, as no case-mortalities were given.

Turning to papers in which detailed reports of cases treated are given, reference may be made to one by E. A. Bourke, J. D. Evans, and S. Rowland,¹¹ who, following the work of the latter in the case of antiplague vaccine, made use of autogenous living vaccine in the treatment of typhoid fever. According to them, it is the common experience of bacteriologists that all antigens are very delicate substances, and that any physical agency employed to kill the enveloping bacillus acts deleteriously on the contained antigen. Therefore, if the treatment is of service, a vaccine composed of living ought to be more efficacious than one composed of dead organisms, especially in the case of an autogenous vaccine. The experience of plague vaccine has shown the importance of the strain of organism employed. The authors publish details of six cases in which the patients were treated with a living vaccine made of bacilli derived from the patient himself. Five c.c. of blood were drawn from the arm and transferred immediately to 1 per cent sodium taurocholate. From this a broth culture was prepared, the purity and identity of the growth being verified by agglutination and sugar-fermentation tests. The broth culture was re-inoculated into fresh broth every day, and itself constituted the vaccine. The age of the culture used was generally eighteen hours. The dosage appears to have been 60 to 300 million. In four of six cases recorded it seems that the course of the disease was cut short by the administration of two doses of the vaccine.

Another paper in which details are given is that by Wiltshire and MacGillycuddy,¹² who treated fifty cases with the stock army vaccine. The first conclusion these observers draw is that stock typhoid vaccine is a valuable therapeutic agent in the treatment of typhoid. [A careful study of the paper hardly leads to so decided a conclusion.—E. W. G.]. The dosage advised is 250 million to start with, with an interval of three days between the doses. Shorter intervals, they state, are not well tolerated. When a longer interval is given, if four days the dose should not be increased, if over four days it should be reduced.

The remaining papers to which reference will be made have been published in American journals. Of these, one of the most notable is that by E. B. Krumthaar and Richardson,¹³ recording the results of

vaccine treatment in three series of cases, of which 93 is the total number. There were 7 deaths and 5 relapses amongst them. The vaccines employed were dead stock vaccines. The paper is valuable, not only because it gives details of a number of cases treated by the authors themselves, but also because of the excellent list of references to the work of others. The authors took the formation of agglutinins as the evidence that the vaccines they used were efficacious in the production of antibodies. "It must be remembered," they write, "that many strains of typhoid bacilli have very little ability to form agglutinins, while the culture from which our vaccines are made has been picked largely for its value in that direction, and is therefore presumably better than an autogenous vaccine." In this opinion they differ from other writers, such as Bourke, Evans, and Rowland, already quoted. "It is frequently found that a bacillus from a virulent case is poor in agglutination, just as one strain used for vaccination, though strong in agglutinins, is weak in toxic properties." The authors give a table of the cases recorded by many other observers, and in it they include their own. The total number is 1806, with 99 deaths (5.4 per cent) and 88 relapses (4.8 per cent). This seems to be an excellent result. The following are the most important conclusions:—

"The proper use of vaccines has been found clinically to be without harm, and generally to produce beneficial results. It rarely causes any noticeable aggravation of the symptoms, beyond a fleeting rise of temperature. Relapses and complications are diminished in frequency, though not prevented. The best results are obtained if the injections are begun early in the disease, especially before the tenth day. The contra-indications are not yet clear. We should hesitate to advocate their use in moribund or very toxic cases, during hæmorrhages or suspected perforations, or in such complications as pneumonia or otitis where other micro-organisms are involved. The best dosage has not yet been determined. The more severe the disease, the smaller and more cautious should be the dosage. With our method of preparation we felt the best initial dose for an average adult was 500 millions; if this proved to be the proper amount, two or more larger doses were given, usually at three-day intervals."

The question of treatment by **Sensitized Vaccines** is also discussed by more than one writer. F. P. Gay¹⁴ is of the opinion that in respect of the treatment by ordinary vaccines the results obtained by a number of observers in about 800 cases are by no means striking; but in the last two or three years certain modifications have been introduced which have yielded better results. These modifications are the intravenous (instead of the subcutaneous) injection, and the employment of sensitized vaccines. Gay refers to a paper by Kraus¹⁵ in which were reported a relatively large number of abortive cures following the intravenous injections of Vincent's typhoid vaccine, and to another report by Ichikawa,¹⁶ who, using bacilli sensitized with the serum of patients convalescent from typhoid, obtained still more favourable results. Gay himself treated 22 cases with the

intravenous injection of sensitized vaccines, and claims to have produced an abortive cure in 8 of them. The best dose, apparently, was about 300 million bacilli, and "this dose in an adult produces the characteristic reaction on which the abortive cure apparently depends. This reaction . . . consists in a chill within half an hour following the injection, accompanied by a rise in temperature of one or two degrees, followed by a fall to normal or subnormal in twelve to twenty-four hours." The initial rise is accompanied by a leucopenia, the subsequent fall by a leucocytosis which may reach even as high as 40,000 per c.c. In no case did Gay meet with any dangerous symptoms referable to the vaccine, when moderate doses were used.

The same subject is dealt with by Jobling and Petersen.¹⁷ They do not appear to have treated any cases themselves; but in view of certain experiments made by them on animals, and the cases published by others, they believe the conclusion is warranted at present that intravenous bacteriotherapy offers a reasonably safe method of treatment in select cases. They draw attention to Kraus's observation that the effect of the use of typhoid vaccines was not specific, in that he obtained defervescence as well with colon bacilli. Moreover, they point out that there have been isolated cases in which the injection of the vaccine has been followed by alarming collapse, and refer to a paper by Sladek and Kotlowski,¹⁸ who emphasize more especially the increase in intestinal peristalsis, with consequent danger of hæmorrhage and perforation, and the cardiac collapse that may result. In endeavouring to explain the action of the sensitized vaccines, these writers state that the fact should be kept in mind that the effect is not specific, and possibly the non-specific ferments of the body are stimulated, and in some way bring about the destruction of the invading organism and a detoxication.

Another attempt to give an explanation why sensitized should be more efficacious than non-sensitized vaccines in the treatment of typhoid fever is made by A. L. Garbat.¹⁹ Sensitization means the mixing of an antigen (bacteria, red blood-cells, etc.) with its specific antibodies. If an animal is injected with typhoid bacilli, various antibodies, agglutinins, bacteriolysins, and bacteriotropins (opsonins) appear in its serum. If an emulsion of typhoid bacilli be mixed with this serum, inactivated, the bacilli become united with the specific immune bodies. Both living and dead bacilli can be sensitized. According to the author, "the immunity attained by injections of non-sensitized typhoid bacteria is actively bacteriolytic and only slightly bacteriotropic in character, while with sensitized bacteria it is mainly bacteriotropic." Sensitized bacilli, that is, bacilli combined with their specific immune bodies, are, when injected into an animal, ready to be acted upon by the existing complement, and therefore the process of their destruction begins at once. But when non-sensitized bacilli are injected, the immune bodies have to be formed, and it is therefore some time before the process of destruction begins. The breaking up of the bacilli sets free their endotoxin, and this forms

an antibody (anti-endotoxin), which is bacteriotropic (opsonic) in character. The prophylaxis attained by the use of sensitized vaccines cannot be explained on quite the same principles as apply in the case of ordinary, non-sensitized vaccines. The injection of the latter leads to the more or less slow formation of various antibodies which remain in the blood and act as defensive agents against any subsequent invasion by typhoid bacilli. But in the case of sensitized bacilli, which are at once broken up on being injected into an animal's body, only bacteriotropic substances are formed in any quantity, and not bacteriolytic substances as in the former case. Hence prophylaxis set up by the injection of sensitized bacteria depends chiefly upon the stimulation of phagocytic activity. In view of these considerations, the author suggests that to obtain the best prophylactic results a mixed vaccine of sensitized and non-sensitized bacilli should be used.

As regards the therapeutic use of vaccines in typhoid fever, "the injection of ordinary vaccines aims at nothing more than what the body is already doing with all its power, namely, the production of antibodies for the breaking up of the bacteria, the liberation of their endotoxins, and the ultimate manufacture of anti-endotoxins. . . . As a general rule, however, it is best to relieve the sick body as much as possible of any active reaction. During an infection the tissue cells are less responsive than during health, especially if the disease be a severe and prolonged one. That is why an efficient serum (passive immunity) would be the ideal form of specific therapy. Sensitized vaccines possibly hold a position between serum-therapy and ordinary bacteria treatment. In the first place, they might save the system from the strain of producing the primary antibodies for the destruction of the bacteria, and second, this provision might hasten the stage of liberation of the endotoxins and the stimulation of the anti-endotoxins, an important step in the recovery from the disease."

Acting on these ideas, the author prepared a sensitized vaccine. He obtained the bacilli from the blood of three patients who were suffering from the disease. To sensitize them, he used the immune serum taken from the same three patients when they were convalescent. The dosage used was 500 million both for the first and subsequent inoculations. Usually two to four inoculations, at intervals of five to seven days, or longer, were necessary until the temperature became normal. He found that both local and systemic reactions were exceedingly slight. Seventeen consecutive cases were treated with this vaccine, with one death. The usual therapeutic measures, sponging, baths, etc., were also employed. In four cases there were relapses. In two of the cases the temperature subsided somewhat acutely in from forty-eight to seventy-two hours after inoculation. The author candidly admits that from so few cases he can draw no certain conclusion, but "the impression was gained that the inoculated patients were what might be termed mild cases with comparatively few complications." No harmful effects took place in any of the cases.

In reference to the treatment of typhoid by a specific antiserum, alluded to by this writer, it may be noted that more than one observer quoted (e.g., Wiltshire, Gay), believe that the best results would be obtained by a combination of vaccine and serum treatment.

From all that has been quoted on the subject of the treatment of typhoid fever by vaccines, it is clear that very much has yet to be learnt. The results have certainly not been striking; they are not better than, if as good as, those which have been claimed for several other methods of treatment, notably that by repeated baths. There is much divergence of opinion on such important questions as those of dosage, the spacing of the doses, and the mode of action of the vaccine. Few of the writers appear to have had a really large experience of this special treatment; and it would further appear that by no means all of them have had sufficient experience of other methods to enable them to make a just comparison.

Walter Coleman,²⁰ New York, publishes the results of experiments carried out by him and E. F. Du Bois primarily to determine whether **High-calorie Diet** in typhoid fever exerted any deleterious influence on the patient, and whether and in what way the food was utilized after its absorption. The method employed was that of indirect calorimetry, by which the heat production is calculated from the oxygen consumption and the output of carbon dioxide, allowance being made for that portion of the respiratory exchange which is due to protein metabolism. The apparatus used was the Benedict 'universal' or 'unit.' The observations on the patients were made in periods of fifteen minutes each, shortly after meals.

The author states that the rôle of fat in the diet of fever cases has not yet been ascertained; but his clinical experience leads him to believe that it is a most important item. His general conclusions are as follows: (1) Food does not increase the heat production or the temperature in typhoid fever, even when given in large amounts (at least when the quantity of protein is kept relatively low). Therefore, the fear which has been entertained by physicians for so many years that a liberal diet would raise the temperature of the patient is proved to be groundless. (2) The body uses carbohydrate in preference to fat or protein to meet the increased demand for energy in typhoid fever, as it does in health when called on to perform additional work. Consequently, carbohydrate should occupy a prominent place in the diet.

E. de Massary²¹ recommends the continuous application of **Ice** to the abdomen. He is of the opinion that this allows the patient to obtain much more rest than does any other refrigerating method (baths, packs, etc.), and he attaches very great importance to this. In addition, he encourages the patients to drink freely of lemonade, weak tea, and such liquids, in addition to the milk which he gives as the staple diet. Occasionally, in cases where there is vomiting or nausea, he employs the rectal injections of glucose solution mentioned below.

Unfortunately it will sometimes happen that it is not possible to

employ the usual hydrotherapeutic measures—baths, sponging, and packs—which most authorities agree are the best methods of treating typhoid fever. This is more especially the case when the patients are many and the nurses few. Under such circumstances Emile Weil²² recommends the rectal injection, by Murphy's drop-by-drop method, of boiled water in which **Glucose** has been dissolved. In 1 litre (1½ pint) of water at 40° C. (104° F.) are dissolved 50 grams (770 gr.) of lactose or ordinary sugar. This solution is allowed to flow into the rectum at the rate of 60 to 100 drops a minute. At this rate the vessel containing the solution will require to be refilled only once every three or four hours. It is not necessary to take any precaution about keeping the solution at the initial temperature. The sugar acts not only as a food, but as a diuretic. As a stimulant, the same author recommends the remedy which is so much used on the Continent, namely, **Camphorated Oil**. It is given subcutaneously three times a day, in doses of 2 c.c. (36 min.) of a 1-10 solution.

PROPHYLACTIC INOCULATION.—The value of preventive inoculation in the British Army is shown by figures given by Mr. Tennant, Under Secretary for War, in the House of Commons, July 1, 1915. He stated that up to May 22 there had been in the Expeditionary Force in France 827 cases of typhoid fever. Of these, 508 occurred amongst the uninoculated, and 106 died, 20·6 per cent mortality; while 319 occurred amongst the inoculated, and 22 of them died, a mortality of 6·8 per cent. He further stated that the ratio of attacks was fourteen times and of deaths forty-two times greater among the uninoculated than amongst the inoculated.

In previous volumes of the **MEDICAL ANNUAL** the statistics of inoculation in the United States Army have been given. The following table brings them up to date :—²³

VACCINATION AGAINST TYPHOID IN THE U.S. ARMY.

YEAR	Number of persons vaccinated	Number receiving three doses	Cases of typhoid fever	Army, mean strength
1908*	0	0	239	74,692
1909, to Sept. 1*	830	621	282	84,077
1910*	16,093	11,932	198	81,434
1911, Jan. 1 to June 30*	27,720	25,779	70	82,802
July 1, 1911, to June 30, 1912†	40,057	All	27	88,478
July 1, 1912, to June 30, 1913†	25,086	All	4	90,752
July 1, 1913, to June 30, 1914†	35,902	All	7	92,877

* Vaccination voluntary.

† Compulsory.

Of the 7 cases of typhoid fever in the last period, 1 occurred in an uninoculated man, and in 3, and probably 4, the inoculation was performed during the incubation period. Lyster, who publishes these figures, does not think that any improvements in sanitation

that may have taken place during recent years have been responsible for the marked decrease. He adds that soldiers are as freely exposed to the infection of typhoid as are civilians, and measles, scarlet fever, and influenza occur amongst them in large numbers of cases, but not typhoid. During the first six months of 1915 only one case of typhoid had been reported in the U.S. Army.

During the first fortnight of September, 1914, typhoid fever began to make its appearance in the military territory of the Government of Belfort. Active measures were quickly put into force in order to stay the spread of the epidemic. The infected cantonments were evacuated; the most suspicious wells were condemned, and weak tea was distributed amongst the soldiers as a drink; as close an observation as possible was kept on all cases of fever; and finally, inasmuch as there were 80,000 men, reservists and territorials, in the area, who were not inoculated against typhoid, it was ordered that inoculation should be enforced amongst them, as it had already been in the active army. A detailed account is given by H. Bousquet,²⁴ of the methods and arrangements used in inoculating large bodies of men expeditiously. Judging by the admissions to the hospital for infectious diseases, the epidemic was at its height about October 5, after which it rapidly declined during the month. Bousquet attributes this decline very largely to inoculation; but one cannot help feeling that part of it, at any rate, must have been due to the other methods given above, which were, apparently, actively carried out.

Bousquet and his colleagues inoculated over 50,000 men. In not a single case was there any serious complication. A very few of the men had a moderate or slight febrile reaction. G. Maurange,²⁵ who inoculated over 5100 civilians, also met with no cases in which any serious complication arose. In a series of 7000 inoculations in an alien concentration camp in England, reported by W. Gordon Cheyne,²⁶ there was not one case of a serious reaction.

Bearing on the question of the protective efficacy of antityphoid inoculation, reference may be made to what appear to be failures which are reported in a letter written by J. G. Gaither.²⁷ He states that in a small community in southern Kentucky, in which there had been approximately 1000 cases of inoculation, five developed typhoid within eighteen months of their inoculation. The letter was referred by the editor of the paper in which it appeared, to the State Board of Health in Kentucky, who wrote to point out that Gaither's account did not agree with the information furnished to the Board, according to which, of 6739 persons inoculated against typhoid during the period in question, not one had developed typhoid. Three cases occurring in inoculated persons are also reported by L. J. Harris and M. L. Ogan (New York);²⁸ but the authors point out that the evidence in favour of protective inoculation is now so overwhelming that occasional failures such as they report cannot be allowed to outweigh it. These authors give a good *résumé* of the symptoms of the reaction and the number of cases in which they occur.

An account of an outbreak of typhoid fever in an institution, occurring three months after the use of prophylactic vaccine, is given by E. H. Trowbridge, B. A. Finkle, and Elizabeth M. Barnard.²⁹ Early in the spring of 1914 several cases of typhoid fever occurred in the Minnesota School for Feeble Minded. To prevent the development of new cases, resort was had to inoculation, and 1520 patients were inoculated in the usual manner. The authors state that new cases ceased to develop, following the administration of the prophylactic, until the outbreak of the epidemic they report. This began about the middle of September, 1914, three months after the completion of the inoculation of the inmates. There were 57 cases which were diagnosed as typhoid, 46 amongst the inmates and 11 amongst the staff. Only one of the staff had been inoculated; and three of the inmates attacked had not been inoculated. In all the cases, anorexia, indefinite pain in the back, neck, or abdomen, headache, and constipation were present. In only three of the inoculated cases were there acute toxæmia and marked prostration. In most cases enlargement of the spleen, rose-spots, epistaxis, and abdominal tenderness were absent. The course of the disease, however, did not appear to be appreciably shortened. The fatality amongst the inoculated was 9.1 per cent; amongst the uninoculated, 23 per cent. About half as many cases occurred in the inoculated as in the uninoculated.

The authors further state that it is known that the blood acquires an agglutinating property during an attack of typhoid fever, and that while this property disappears after varying lengths of time, the patient in the vast majority of cases acquires a lifelong immunity. "At present the only laboratory index by which immunity is suggested is the appearance of agglutinins in the blood. The occurrence of clinical typhoid fever in those having been previously inoculated proves that the appearance of agglutinins in the blood is not a positive index of immunity." In this epidemic 14.3 per cent of those attacked gave positive serum reactions after their inoculation, 21.4 per cent gave atypical, and 64.3 per cent negative reactions.

Another outbreak of typhoid fever in an institution where some of the persons attacked had previously been inoculated is that which occurred in January and February, 1915, in the Sloane Hospital for Women, New York, recorded by M. L. Ogan.³⁰ Eight cases occurred amongst 46 persons who had been previously inoculated, or 17 per cent, and 6 amongst 30 non-inoculated, or 20 per cent; that is to say, there was very little difference in the attack-rate of the two groups. But he points out that in several cases the preventive inoculation had been practised over two years previously, while in others it had not been complete, insufficient injections having been made. The only death occurred in one of these cases. Generally the cases were mild.

Another institution epidemic, reported by W. R. Elmer,³¹ is of interest because several of the patients were inoculated against typhoid fever during either the incubation period or the early stage of the disease. The outbreak occurred amongst the staff of the

St. Louis City Hospital in the autumn of 1914. There were 43 cases altogether, and of these, 23 developed amongst persons who had received no vaccine. Amongst them were no deaths and no severe cases. Twenty of the patients received vaccine. From the notes of the cases it can be concluded that in 5 cases the inoculations were performed during the incubation period, in 4 during the early stages of the attack, and in 1 just before the incubation period. None of these cases were fatal, but two were severe. The report does not say in detail at what period the remaining cases were inoculated, but from a statement made in the paper that practically all the vaccine was given between August 28 and September 14, it would appear that it was administered during the incubation period or early stages in these also. No harm was done to any of the cases by the inoculation; on the other hand, the attacks do not seem to have been cut short or the severity lessened. One of the conclusions the author draws is that the administration of antityphoid vaccine to a person already infected with typhoid may precipitate an attack; but there does not seem to be any evidence to prove this.

A. Castellani³² again draws attention to the advantage of employing a **Mixed Vaccine** of typhoid, paratyphoid A, and paratyphoid B in persons who are likely to be exposed to the triple infection (as is the case now on the Continent, at any rate in the zone of the armies). The mixed vaccine may be prepared according to various methods. The simplest consists of an emulsion of typhoid + paratyphoid A + paratyphoid B bacilli, killed by heat or by adding $\frac{1}{2}$ per cent carbolic acid without heating, and standardized so that 1 c.c. will contain approximately 500 million typhoid bacilli and 250 million each of paratyphoid A and B. Of this the first dose is 0.5 to 0.6 c.c., the second, given one week later, 1 to 1.2 c.c. "The mixed vaccine is harmless, does not give a severer reaction than simple typhoid vaccine, and the inoculated persons develop protective substances for the three diseases."

Widal³³ also recommends inoculation with triple vaccine. He made a number of experiments on guinea-pigs, which showed not only that the animals could stand inoculation with the large number of bacilli contained in the triple mixture, but also that these inoculations were effective as prophylactics. He advises 2500 million of each bacillus, i.e., 7500 million bacilli altogether, spread over three doses of 2, $2\frac{1}{2}$, and 3 thousand million, or four of $\frac{3}{4}$, $1\frac{1}{2}$, $2\frac{1}{4}$, and 3 thousand million. He states that from experience in men no harm results from these inoculations.

Dakeyne³⁴ gives the results of a preliminary inquiry into the power which the blood of persons inoculated with dead typhoid bacilli has to agglutinate the *Bacillus typhosus* within certain periods of time after the last inoculation with vaccine. The results, as shown by statistical tables regarding 280 men examined, justify the following conclusions: (1) A man inoculated twice has a much greater chance of developing and retaining an agglutinating reaction than one

inoculated only once; (2) There is a gradual diminution of the reaction as the result of the lapse of time; this is especially marked at the end of the eighth month. (3) Only 1 case out of 19 examined within a month of inoculation was found negative. (4) It appears that after the end of the first month the reaction is liable to disappear rapidly.

Some very interesting observations are to be found in a paper by Adam Patrick³⁵ on the agglutinating power of the serum of a person inoculated against enteric fever.

The author's observations lead him to the conclusion that the serum of persons who have received two or three inoculations with dead *B. typhosus* has usually a stronger agglutinating power than that from a case of typhoid fever. In a series of 51 cases of typhoid, the three most active sera obtained showed agglutination up to dilutions of 1-30,000, 1-25,000, and 1-20,000 respectively. R. T.'s serum in its most active stage showed an agglutination limit of 1-200,000. A very powerfully agglutinating serum (to 1-70,000), was obtained by intraperitoneal injection of a rabbit with dead typhoid bacilli, and another, agglutinating to 1-800,000, with paratyphoid bacilli. "This difference between the results of an artificial inoculation and of the germs acting in disease, demonstrates the possibility, at least, that in an acute infection a vaccine of the organism may have some action different from that of the toxins of the disease. In seven cases to whom doses of typhoid vaccine were given in the course of the illness, no striking change was found in the agglutinating power of the serum after these injections." Eight of the 51 cases of typhoid mentioned above were fatal; and in seven of these the agglutination limit was 1-20,000, 1-15,000, 1-13,000, 1-12,000, 1-6000, 1-5000, and 1-400; so that there does not seem to be any foundation for the view that a favourable prognosis may be made in cases in which the agglutinative power is high. The author states that whereas the serum of almost every case of typhoid fever agglutinates paratyphoid bacilli to some extent, the serum of the artificially immunized person, R. T., showed less power to do so.

For similar observations on the length of time which agglutinins will persist in the blood after antityphoid inoculation, a paper by Dreyer and Inman³⁶ may also be consulted. These writers confirm Leishman's conclusion that after a double dose of vaccine an increased resistance to infection for a period up to eighteen months or two years could be found statistically.

Blood Transfusion recommended (*p.* 8); **Hordenine** injected intravenously (*p.* 21); **Sulphur** (*p.* 34); antityphoid inoculation (*p.* 36).

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1915, i, 1322; ²*Ibid.* 1914, ii, 1537; ³*Boston Med. and Surg. Jour.* 1914, ii, 929; ⁴*Quart. Jour. Med.* 1914, Oct. 91; ⁵*Lancet*, 1915, i, 324; ⁶*Presse Méd.* 1915, 333; ⁷*Brit. Med. Jour.* 1915, ii, 137; ⁸*Jour. Trop. Med. and Hyg.* 1915, 67; ⁹*Progrès Méd.* 1915, 464; ¹⁰*Lancet*, 1915, i, 602; ¹¹*Brit. Med. Jour.* 1915, i, 584; ¹²*Lancet*, 1915, ii, 685; ¹³*Amer. Jour. Med. Sci.* 1915, i, 406, and *Ther. Gaz.* 1914, ii, 843; ¹⁴*Jour. Amer. Med. Assoc.* 1915, ii, 322; ¹⁵*Wien. klin. Woch.* 1914, 1443; ¹⁶*Sei-I-*

Kwai Med. Jour. 1915, xxxiii, 73 ; ¹⁷*Jour. Amer. Med. Assoc.* 1915, ii, 515 ; ¹⁸*Wien. klin. Woch.* 1915, 389 ; ¹⁹*Jour. Amer. Med. Assoc.* 1915, i, 489 ; ²⁰*Ibid.* 1914, ii, 932 ; ²¹*Presse Méd.* 1915, 9 ; ²²*Ibid.* 11 ; ²³*Jour. Amer. Med. Assoc.* 1915, ii, 510 ; ²⁴*Presse Méd.* 1914, 699 ; ²⁵*Ibid.* 733 ; ²⁶*Brit. Med. Jour.* 1914, ii, 1021 ; ²⁷*Jour. Amer. Med. Assoc.* 1914, ii, 1314 ; ²⁸*Ibid.* 1915, i, 3 ; ²⁹*Ibid.* 728 ; ³⁰*N.Y. Med. Jour.* 1915, i, 620 ; ³¹*Jour. Amer. Med. Assoc.* 1915, i, 1147 ; ³²*Brit. Med. Jour.* 1915, i, 758 ; ³³*Presse Méd.* 1915, 305 ; ³⁴*Lancet*, 1915, ii, 540 ; ³⁵*Glasgow Med. Jour.* 1915, i, 268 ; ³⁶*Lancet*, 1915, i, 225.

TYPHOID FEVER, BACTERIOLOGICAL DIAGNOSIS OF.

O. C. Gruner, M.D.

A number of simple methods of rapid diagnosis have been devised, as a result of the need for prompt action in the war zone. The following are taken from the German literature :—

Königsfeld¹ uses slopes of Endo's medium, and Conradi-Drigalski's medium containing mannite instead of lactose. To each tube is added 1½ to 2 c.c. ox-bile. The blood to be examined is obtained direct from the ear lobule (ether sterilization) and run into the bile. The tube is then tilted in order to cause the bile-blood mixture to flow over the agar slope once or twice. The tubes are now incubated. In ten to fourteen hours the organisms should be found in the fluid, and on the medium nearest to the bile.

	Endo	Mannite—Conrad
<i>B. coli</i>	Red ..	Red
<i>B. typhosus</i>	No colour ..	Red
<i>B. paratyphosus</i>	No colour ..	Red
Cocci forming acid ..	Red ..	Nil
Cocci not forming acid ..	Nil ..	Nil
Pneumococci	Hardly grow ..	Hardly grow
Streptococci	Hardly grow ..	Hardly grow

Dysentery does not signify. (Doubtless this contingency will have called for consideration by this time.) To distinguish between the two forms of typhoid, a subculture is made on a neutral red slope, using bile in the same way as before. *B. typhosus* does not alter the red, *B. paratyphosus* decolorizes it. The neutral red must not be too dark.

Liebermann and Acel² use a horse-flesh medium coloured with Congo red. *B. coli* gives black colonies and *B. typhosus* gives more or less intense red colonies. For agglutination, these authors dilute two drops of blood in 1 c.c. distilled water, and operate with the hæmolyzed fluid.³

Perlmann⁴ uses the macroscopic method of agglutination, staining the fluid with three tiny drops of 0.5 per cent alcoholic methyl orange. This enables the precipitate to be seen more easily in artificial light.

Latham⁵ takes one part of serum, three parts of tap-water, mixes them in a Wright pipette, and then adds four parts of typhoid emul-

sion containing 1 per cent formaldehyde. A positive agglutination is visible to the naked eye as a cloud of tiny particles within two minutes. The formalized emulsion will keep for at least six months. The emulsion becomes sterile without additional treatment.

REFERENCES.—¹*Münch. med. Woch.* 1915, 130; ²*Deut. med. Woch.* 1914, 2093; ³*Ibid.* 2066; ⁴*Münch. med. Woch.* 1915, 435; ⁵*Med. Jour. Austral.* 1915, 121.

TYPHUS FEVER.

E. W. Goodall, M.D.

ETIOLOGY.—A summary of the many investigations made to discover the essential cause of typhus is to be found in a paper by R. M. Wilder.¹ He inclines to the opinion, chiefly as a result of observations made by Ricketts and himself and by Plotz, that the typhus organism is a small Gram-positive bacillus, showing a very faintly stained bar across its middle, pleomorphic, non-motile, and not passing through a Berkefeld filter.

SYMPTOMS.—Gwynne Maitland,² in an account of about 1800 cases which passed through his hands in the epidemic in Serbia during the spring of 1915, draws attention to two forms of the disease which he found did not respond to treatment: the fulminating cases, and those which exhibited circulatory stasis. In the former group the attack begins in the usual way, but a different course is noted on the second or third day. The patient passes into a deep coma; subsultus tendinum is marked; there is nystagmus with squint; also muttering delirium and picking at the bed-clothes. There is no control over the sphincters. Death occurs usually within three days. In the second group of cases the patients seem to pass through the whole fever without incident, and appear to be doing well, when on or about the twentieth day circulatory stasis appears. The feet become blue, the pulse is small and thready, sometimes gangrene sets in, and the patient dies as if from asthenia.

In this epidemic, only in a minority of cases did the rash assume the commonly described form. "The majority of cases are protean. Very few of the spots become petechial; the majority vanish before that stage. This is the rule." In many cases the rash is very evanescent. "Again, the exanthem is by no means invariably a spotted rash; it presents usually a kind of watercourse appearance, or a general erythema." By "watercourse appearance" is meant "an appearance as of red channels running in every direction, confluent, and often so diffused as (when not closely examined) to give merely an appearance of erythema." Another interesting fact is that lung complications were seldom met with in this epidemic. In order to prevent the members of the staff from becoming invaded by lice, Maitland devised a garment which he found to be efficacious: a sort of combination suit, made in one piece, fastening at the neck like a bathing-suit—that is, by two buttons on the shoulders. The trousers ended in feet, which were slipped into sandals. To protect the hands, rubber gloves (previously boiled) came up well over the wrists.

Typhus appears to have been very prevalent in Palestine and certain districts of Asiatic Turkey for two or three years before the European War began. C. H. Corbett³ reports that it was epidemic in Palestine in 1913-14, though before that period it had been rare there. C. D. Ussher, of Van, states⁴ that since the winter of 1912-13 it had been raging in the Van, Bitlis, and Erzeroum vilayets. As regards the means by which the disease is disseminated, he writes as follows: "We consider that we have proved conclusively in our hospital that the only means of transmission is vermin. Our nurses have been exposed to every other form of contagion from the breath, desquamation, discharges, constant association day and night, and all this in an over-tired condition; not one of them has contracted the disease. The typhus patients have been put in the same ward with surgical, pneumonia, dysentery, and even confinement cases, and not a single patient has become infected in the hospital. One of the male nurses subjected himself to infected body lice, and promptly contracted the disease (incubation five days). I personally removed the lice from his body. We have become so sure of the mode of infection that, being compelled by lack of bedding, we put patients with other troubles in the beds which had been occupied by typhus patients. We made no further change than clean sheets and pillow-covers, and though in several cases the limit of incubation has passed three times over, there has not been a single instance of infection." [This experience corresponds with that of English hospitals forty or fifty years ago.—E. W. G.]

Ussher was at one time inclined to attach much value to calcium sulphide ($\frac{1}{2}$ gr. every half-hour) in the treatment of the disease, but his later experiences have shaken his belief in the drug. Of great importance is ample air and good nursing. In his hospital and private practice the case-mortality was about 3 per cent, while amongst the soldiers treated in the Turkish hospitals and barracks it was about 75 per cent. Corbett had a similar experience. There was only one death amongst about 20 cases treated in the English Mission Hospital at Jerusalem, whereas the mortality amongst 180 patients treated in the prison of the same place was 50 per cent. This observer also notes, as an extraordinary detail in the epidemic, the infection of single individuals of families which inhabited one room, an incident which was by no means infrequent.

TREATMENT.—According to Mollow,⁵ injections of **Typhoid Vaccine** are beneficial in the treatment of typhus. This was accidentally discovered at Sophia early in 1915, when several cases of fever in the early stage and thought then to be typhoid, whereas later they were found to be really typhus, were treated with Besredka's sensitized typhoid vaccine with such beneficial results that the treatment was regularly adopted for typhus cases. Apparently the vaccine was injected intravenously.

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1914, ii, 937; ²*Brit. Med. Jour.* 1915, ii, 283; ³*Brit. Med. Jour.* 1915, i, 887; ⁴*Med. Rec.* 1914, ii, 509; ⁵*Wien. med. Woch.* 1915, June 5 (quoted in *Brit. Med. Jour.* 1915, ii, 479).

ULCERS OF THE LEG.

E. Graham Little, M.D., F.R.C.P.

Hyperæmia by means of **Dry Hot Air** is recommended by Sonnen-schein¹ in the treatment of chronic ulcers. The heat is applied through a hot-air oven, and the temperature may be raised to from 250° to 300°, and maintained at that for twenty to thirty minutes. If there is indication of nephritic or diabetic disease, the temperatures should not exceed 130°.

Davis² tested his method of **Small Deep Skin-grafts** in the treatment of fifty chronic ulcers arising from various causes, in patients who were allowed to continue their callings during the treatment, and were in no way selected cases. The results are thus tabulated:—Males, 31, females, 19. White, 39, coloured, 11. Ages, 11 to 84 years. Duration, few days to twenty-five years. Size, largest, 8 by 17 cm.; smallest, 1.5 by 1.5 cm. Treatment, small deep grafts were used on 48, Thiersch grafts on 1, whole-thickness grafts on 1. Result, well 36, improved 9, unimproved 5. Of those wounds which were improved by grafting but not completely healed, 5 were situated on the foot and 4 on the leg. Of those which were unimproved, 2 were on the leg, 2 on the foot, and 1 on the chest wall.

For recent treatment *see also Vol. 1915, p. 653.*)

REFERENCES.—¹N.Y. *Med. Jour.* 1914, ii, 1219; ²*Jour. Amer. Med. Assoc.* 1915, i, 558.

UNDULANT FEVER. (*See MEDITERRANEAN FEVER.*)

URÆMIA. (*See KIDNEY, DISEASES OF.*)

URETER, SURGERY OF. *J. W. Thomson Walker, M.B., F.R.C.S.*

An important review of literature and experimental investigation on the subject of *ligation of one ureter* is contained in an article by W. C. Jones.¹ The following is a short summary of this writer's conclusions. The two greatest difficulties in technique in experimental work are the production of complete obstruction without a fistula resulting, and the avoidance of infection. The latter has a very important influence on the result of the obstruction. The literature relating to whether hydronephrosis or atrophy follows complete ureteral obstruction shows that few, if any, careful observations have been made as to whether the kind or age of the animal has any influence. There is very little evidence in favour of the theory that high obstruction leads more frequently to hydronephrosis, and low oftener to atrophy. When atrophy develops, it is almost always secondary to primary hydronephrosis. Atrophy seldom supervenes before the sixtieth day, and few animals are kept alive beyond that time. As a result, more hydronephrotic kidneys than atrophic kidneys are recorded. The less the infection, the more likely and the more rapid is the development of general atrophy. A marked infection seems to preclude atrophy, and leads to the formation of a large cystopyonephrosis. There is some evidence in favour of the idea that renal capsular anastomosis leads to the formation of hydronephrosis, but

this theory is by no means established. Complete, more frequently than incomplete, closure of the ureter leads to renal atrophy. If hydronephrosis follow ureteral occlusion, it develops more rapidly after complete closure, but never attains the immense size possible where obstruction is incomplete.

There is no reason to believe that general toxæmia arises as a result of unilateral ureteral obstruction. Renal reabsorption is rare, and changes in the other kidney are slight. There is no unanimity of opinion in regard to how long a ureter may be completely obstructed without destroying the renal function. A slight increase in intra-ureteral pressure stimulates renal secretion. After sudden complete closure, the pressure rises in a few hours to an average maximum of about 65 mm. Hg. During the next few weeks there is a gradual fall, which reaches nearly zero in a few months.

Jones's experiments on dogs showed that during the first ten days after complete ureteral occlusion the gross changes are not marked, a slight hydronephrosis being the only lesion found. From the tenth to about the sixtieth day constitutes a period of primary hydronephrosis, during which no general atrophy is found. At the end of two months the kidneys are divided into two groups, those which continue to enlarge, and those which undergo general atrophy. Evidence of intrarenal infection is almost constant after the tenth day. If this is only mild, general atrophy takes place; if it is severe, pyonephrosis, with renal dilatation, occurs. It seems more than likely that the less the infection, the more prompt and marked is the general renal shrinkage and fibrosis. The infection is hæmatogenic in origin. Perirenal anastomoses do not favour the development of hydronephrosis. Jones found evidence to show that low ligatures of the ureter are much more prone to be followed by atrophy than high ones.

Geraghty and Hunner² discuss special means of diagnosis and intravesical treatment of *ureteral calculi*. The position of the calculus in the ureter in 49 cases was as follows :—

Intramural position	14.3 per cent
Pelvic position—Near bladder ..	40.8
Near pelvic brim ..	18.3
Iliac portion	59.1
Lumbar portion	2
	24.6

The size of the stone bears no relation to the severity of the symptoms. Calculi of moderate size may be passed with comparatively little discomfort, while a tiny stone may cause the most excruciating pain. Symptoms may be entirely absent and the stone unsuspected for years. The authors hold that it is impossible to make a diagnosis of the position, or even of the presence, of a ureteral calculus, by the character and location of the pain. It is very rare to find complete absence of red blood-corpuscles on microscopical examination of the urine. The presence of microscopic blood is no proof of the presence

of a ureteral calculus, but its complete absence, on repeated examination, is very strong presumptive evidence of the absence of ureteral calculus. In 67 cases, the x rays failed to throw a shadow in 15, or 22.4 per cent. In 7 of these the stone was subsequently passed. In 6 cases a wax-tipped catheter showed scratches, and the diagnosis was afterwards confirmed. In two cases stone was found on exploration. Stones are most frequently missed in the lower portion of the ureter, but also in the upper portion. The writers believe that the number of cases in which calculi are missed by the x rays is greater than their figures show. Stones composed of calcium phosphate and carbonate, without any uric acid, may fail to cast a shadow. The use of wax-tipped catheters, both in the female and in the male subject, is recommended as a very valuable method. Where the x rays fail to reveal a calculus, the authors state that the injection of collargol will show the shadow of the stone by adhering to it. (*See also p. 54.*)

Medical treatment, according to the authors, has a very restricted field. **Turpentine** has proved of some value. Piperazine and large quantities of glycerin have not been successful. Diuretic treatment, the most important medicinal agent, is not mentioned. When the calculus is small, the passage of a ureteral catheter may dislodge it, and be followed by passage of the stone. The injection of olive oil may facilitate its passage. The use of a specially designed catheter which can be heated by electricity is recommended, in order to cause relaxation of the ureteric muscle. When the stone lies at the ureteral orifice, manipulation with a stiff catheter may dislodge it, or the ureteric orifice may be enlarged by means of a special knife or the high-frequency cautery.

Watson³ points to the frequency of mistakes in diagnosis between appendicitis and stone in the ureter, and gives the subjoined table in aid of differential diagnosis:—

Symptoms	Ureteral Stone	Appendicitis
Mode of onset ..	Sudden and intense	Gradual and less intense
Referred pain ..	Urogenital area ..	Iliac region
Temperature ..	Normal or abnormal	Elevated
Pulse	Quickened temporarily	Increasing frequency
Vomiting	Present	Present
Bowels	Tenesmus may be present	Constipation
Bladder	Frequency and tenesmus, if impacted in lower ureter	Frequency may be present
Urine	Albumin, blood, pus	No change
Blood count ..	Normal	Leucocytosis

REFERENCES.—¹*Amer. Jour. Obst.* 1914, ii, 329; ²*Surg. Gyn. and Obst.* 1915, i, 515; ³*Brit. Med. Jour.* 1915, i, 993.

URETHRA, DISEASES OF. *J. W. Thomson Walker, M.B., F.R.C.S.*

Randall¹ contributes an article on clinical manifestations of *polyps of the male urethra*. The writer had an experience of 14 cases of urethral polyp which had the following composition: (1) Benign fibrous polyps composed of loose fibrous tissue, with a few muscle bundles and blood-vessels, and covered with normal urethral mucous membrane; (2) Benign villous polyps; (3) Benign glandular polyps which showed gland acini and deep infolding of the mucous membrane. The symptoms presented by these cases showed no characteristic grouping. Nine patients complained of a chronic urethral discharge, generally of a mucoid nature, in none of which was the gonococcus found. In patients who had no discharge, the growth was situated in the prostatic urethra. Spontaneous urethral hæmorrhage was present in only one patient. Reflex and radiating pains of very varying character were almost always present. Two complained of a sensation of a foreign body, and one felt a thrill during micturition. Six patients had sexual disturbances, and the polyp in such cases was always in the posterior urethra.

The treatment used was **Removal** by snare or alligator forceps through a straight open tube. Instillations of nitrate of silver, and the high-frequency current, were abandoned as being respectively inadequate and painful.

According to Wolbarst,² many obstinate and incurable lesions involving the deep urethra are due solely to involvement of the *colliculus seminalis* or *verumontanum*. Chronic inflammatory disease of the verumontanum may simulate lesions of the prostate and seminal vesicles. The symptoms vary, and there is no particular symptom that might be considered pathognomonic of colliculitis. The most frequent symptoms in uncomplicated colliculitis are premature ejaculation of semen and partial or complete impotence. These symptoms frequently co-exist, and the colliculus is seen through the urethroscope swollen, congested, and tender, and easily bleeding. Frequent diurnal micturition is a common symptom, with or without a preceding gonorrhœa. Inflammation of the colliculus and adjacent parts is found, and cysts and polypi are not infrequently observed; the latter may also occur on the roof of the urethra, immediately anterior to the internal sphincter. Defæcative spermatorrhœa is usually ascribed to prostatitis, but Wolbarst has seen a case due to colliculitis. Shreds in the urine, a mucoid discharge from the meatus, and inability to empty the urethra of the last drops of urine, are frequent complaints, and the writer has observed sterility due to azoospermia, without any history or evidence of gonorrhœa or of epididymitis. Wolbarst has seen as many cases without as with a previous history of gonorrhœa. In nearly all cases some form of sexual excess or abuse is present. The changes in the colliculus that may be observed are erosions, granulations, polypi, cysts, papillomata, excrescences, vegetations, hypertrophy, simple congestion, swelling, and deformities of various kinds. Treatment of the condition is in an embryonic

state, but the author claims that striking results have been obtained by catheterization and other means.

Rytina³ prefers radical removal of the verumontanum to the use of the thermocautery or repeated applications of strong nitrate of silver. The instrument he uses is an outer tube resembling an ordinary curved posterior urethroscope, with a large window on the convex surface. Inside this glides a second tube, also fenestrated, and with the edges of the window sharp. An endoscopic tube illuminates the field displayed by the window. When the verumontanum lies in the field of the window, the light is withdrawn and the inner tube rotated, so that the sharp edge slices off the verumontanum. The pain following this operation is less than that after a strong silver nitrate instillation, and the hæmorrhage is never alarming. In eighteen cases the only complication that occurred was one of epididymitis. Following removal of the verumontanum, endoscopy shows a slight elevation of the mucous membrane, and one or both ejaculatory ducts are, in most cases, visible. Spermatozoa can be demonstrated in the semen after the operation, which proves the potency of the ejaculatory ducts. The author is not prepared to speak of the clinical value of the operation, but discusses the anatomy and pathology of the verumontanum.

Randall⁴ finds, on endoscopic examination of cases of *abnormal urethral emissions*, that there are changes in the wall of the posterior urethra or, more frequently, of the verumontanum. The mucous membrane of the posterior urethra may be engaged and thickened or varicose, and the verumontanum enlarged, tender, raspberry-like, and covered with granulations. Actual ulceration is rare. In 21 per cent of cases there was no history of gonorrhœa. There was sexual excess in practically all these cases. In 42 per cent there was a previous history of gonorrhœa. The local treatment was carried out through the urethroscopic tube. Silver nitrate in varying strengths was the most reliable application. The author used 10 to 20 and 50 per cent solution for superficial changes, and solid nitrate of silver for catheterization.

Hamilton Russell⁵ advocates the more extensive use of **Excision** in the treatment of *urethral stricture*. He brings the following observations to bear on the operation: The male urethra may be slit up from the membranous portion to the meatus or to a less extent, with the assurance that no harm will result, and that no difficulty will be experienced in restoring its integrity, provided efficient perineal drainage of the bladder is secured during healing. The restoration of the slit-up urethra is left entirely to natural processes, the raw tissues on each side falling naturally together. The operation is carried out in the extreme lithotomy position. (1) A Λ -shaped incision, with the apex at the central point of the perineum, is made for perineal prostatectomy, and the membranous urethra exposed and slit up; (2) A median incision is made to meet the apex of the Λ , and the urethra opened on a Wheelhouse staff in front of the stric-

ture, and slit back to the stricture; (3) The strictural portion of the urethra, with the fibrous extra-urethral masses, is now excised, and the cut ends are freed and brought together by fine interrupted cat-gut sutures. Leaving the urethra without further sutures, a rubber catheter is fastened in the bladder, and the two lateral incisions in the perineum are sutured. No sutures are placed in the perineal wound in front of the catheter, which is left in for a week. If the mucous membrane is only slightly destroyed, only the peri-urethral masses are cut away. As a rule, however, it is necessary to incise a portion of ragged and injured mucous membrane. On more than one occasion the writer has removed upwards of an inch of the urethra. He reserves the operation for cases that are not easily managed by dilatation, and for some patients amenable to dilatation but who wish for a more radical method of treatment.

[This operation differs from that generally used for excision of urethral stricture in two particulars, namely, a very free exposure of the urethra beyond the stricture, and allowing the urethra to heal spontaneously without suturing the longitudinal wound. The real difficulties in excision of urethral stricture, namely, the choice of the best method of dealing with a number of extensive strictures, and the difficulty of obtaining sufficient urethra for suture in a stricture placed far back on the triangular ligament, are untouched. Drainage by perineal tube has no advantage over the suprapubic drainage now used in such cases.—J. W. T. W.]

REFERENCES.—¹*Ann. Surg.* 1914, ii, 325; ²*Amer. Jour. Surg.* 1914, ii, 369; ³*Jour. Amer. Med. Assoc.* 1915, i, 45; ⁴*Ibid.* 48; ⁵*Brit. Jour. Surg.* 1915, Jan. 375.

URINE TESTS.

O. C. Gruner, M.D.

Sugar.—Glaserfeld¹ advises the use of the Trommer and Nylander tests for sugar in urine. If Trommer is positive and Nylander is negative, the reducing substance is not glucose. If Trommer is negative and Nylander is positive, this points to the presence of glucose to less than $\frac{1}{2}$ per cent.

Uric Acid.—Höst² advocates the following colorimetric method of estimating the amount of uric acid in urine. It is a modification of Riegler's method. 2 c.c. urine are treated with 0.6 gram ammonium chloride at 40° C. for half an hour. The fluid is filtered and the precipitate rinsed with 20 per cent ammonium sulphate several times. The precipitate (ammonium urate) is now dissolved on the paper by means of 15 c.c. of boiling 5 per cent disodium phosphate, and the filtrate allowed to run into the first tube. 4 c.c. 90 per cent phosphomolybdic acid are added, and the mixture made up to 20 c.c. with the disodium phosphate solution. After boiling and cooling, the fluid is read off in a colorimeter against a standard solution made of 2 mgrams uric acid + 4 c.c. phosphomolybdic acid + 14 c.c. disodium phosphate.

Acetone and Diacetic Acid.—Derham³ advocates the search for acetone bodies in cases of intestinal stasis. His modification of

Rothera's test is as follows : To a drachm of suspected urine in a slender test-tube add about 5 grains of ammonium chloride and two drops of a recently prepared 5 per cent sodium nitroprusside. Eight or ten drops of strong ammonia are run down the side of the sloped tube, allowing it to float on the mixture. If acetone or aceto-acetic acid be present in any quantity, a vivid crimson ring appears at once, increasing rapidly in depth and intensity. In negative cases there is a faint, white, fleecy ring at the junction line. Even a trace of acetone will give a ring after two or three minutes.

Riegler's test is next applied, in order to ascertain if aceto-acetic acid be present also. The test may be described thus : If two drops of 1 per cent methylene blue, diluted with a little water, need 4 drops of tincture of iodine to decolorize the blue to orange, then it will need 10 to 12 drops of urine to restore the blue. 30, 40, or 60 drops of urine containing aceto-acetic acid will be needed before the colour will change. The amount needed provides a rough estimate of the amount of acid present.

If a urine contains no sugar, and if aceto-acetic acid is transitory, and there are symptoms of gastric catarrh, then the disease is in the alimentary canal.

Infectious Diseases.—Rachmilewitsch⁴ applies the paradimethylamidobenzaldehyde test to decide between certain fevers. The reagent is used in 2 per cent solution in 30 per cent hydrochloric acid. A few drops are added to 1 to 2 c.c. of urine. A strong positive reaction consists in an immediate intense red ; a moderately strong reaction gives a red on warming, a weak reaction only gives it on boiling. Eighty per cent of cases of scarlet fever give this reaction more or less intensely. It is practically always negative in diphtheria. It is never present in serum rashes. The test presents some usefulness in fever-hospital practice.

Urochromogen.—Nicoloyesen⁵ finds that this reaction is positive in 48 per cent of cases of pulmonary tuberculosis. It is ten times as sensitive as the diazo reaction, and is simpler to carry out. (Compare preceding test.)

Urobilin.—The following method of detection is advocated by Edelmann.⁶ The first reagent (I) is a concentrated alcoholic mercuric chloride ; the second reagent (II) is a 10 per cent clear filtered alcoholic solution of zinc chloride. 10 c.c. urine and 5 c.c. No. I are shaken with amyl alcohol. To the supernatant fluid a few c.c. of No. II are added. If urobilin is plentiful a fine rose-red colour appears, and the zinc chloride turns bright green. A smaller amount of urobilin may not cause fluorescence until a beam of light is passed from an electric torch. The green colour is then brought out. No constituent of urine interferes with this reaction.

Iodine.—Schumacher⁷ uses the following test for iodine in urine. A tablet of ammonium persulphate (an anti-gonorrhœa drug) is placed on a filter paper. A drop of urine added will make blue spots appear on the tablet, because the ammonia is dissolved, and the

iodates are turned into iodine, which blues the cellulose of the tablet.

Effect of Diet on the Urine Reaction.—Berg⁸ uses the reaction of the urine as a test for whether a diet is or is not suitable for the patient. Neutral litmus tincture should turn blue if the diet is suitable, as regards uric acid production; if the litmus turns red, there is some error, other things being equal.

Breast-feeding.—Ostrowski⁹ finds that the urine will reveal whether an infant is breast- or bottle-fed. Fifteen to twenty drops of 2 per cent silver nitrate, added to 5 c.c. urine, will give a white precipitate. If the infant is breast-fed, this precipitate will turn black in ten minutes, or on boiling.

Heller¹⁰ finds that albumin is commonly present in the urine of the *newly-born* (3 per cent). The 'acetic-acid body' (slight cloud on adding acetic acid to the cold urine) is frequently found during the first days of life. If this body be in excess, an albumin solution should be added in order to ascertain if a further precipitate comes down. Franz and Reuss¹¹ conclude that the appearance of this body is the result of changed circulation at labour.

Hæmolytic Action.—A phenomenon is described by McKee¹² which has hitherto escaped notice, namely, the rapid laking of blood corpuscles by the urine. This never occurs in the urine of normal individuals. The method of study is as follows: An emulsion of red cells in the proportion of one drop of blood to 4 c.c. of normal saline is first prepared, and one drop added to 15 drops of each sample of urine to be tested. Miniature test-tubes are used. The tubes are then incubated for two hours and a half, shaking several times. Any urine which shows hæmolysis may be further studied by using progressive dilutions of urine. The phenomenon has been noted in pernicious anæmia, acute rheumatism, advanced tuberculosis, certain cases of syphilis, extensive skin disease, cancer with wasting, septic infections. If it be present in cases of acute nephritis the prognosis is bad. Other interesting observations are recorded, but further publications are promised.

REFERENCES.—¹*Med. Klin.* 1914, 1123; ²*Zeits. f. klin. Med.* 1915, 81, Nos. 1 and 2; ³*Lancet*, 1915, ii, 227; ⁴*Jahrb. f. Kinderh.* 1915, 168; ⁵*Med. Rev.* 1914, 462; ⁶*Wien. klin. Woch.* 1915, 978; ⁷*Deut. med. Woch.* 1915, 196; ⁸*Münch. med. Woch.* 1914, June 9; ⁹*Jahrb. f. Kinderh.* 1913, 575; ¹⁰*Zeits. f. Kinderh.* 1913, 303; ¹¹*Ibid.* 1914, 193; ¹²*Brit. Med. Jour.* 1915, ii, 596.

URTICARIA PIGMENTOSA. (*Vol.* 1915, *p.* 662.)

UTERUS, DISEASES OF.

Bryden Glendining, M.S., F.R.C.S.

The papers on myomata of the uterus all give evidence of a competitive spirit at present abroad between the exponents of operative treatment and of Röntgen-therapy. This is nowhere better exemplified than in the article by Werder,¹ where it is recommended that myomectomy be much more extensively employed. Thus, beyond the ordinary cases, in which myomectomy is simple and ideal, there

is a very large group, at present treated by supravaginal hysterectomy, in which much of the uterus might have been retained, with a proportion of functioning endometrium, even though patency of the uterine canal through the cornua to the tubes is scarcely likely, and subsequent gestation is precluded. Werder reports 13 cases in which a myomectomy was performed. Of these, 7 were single and 6 married, and in the latter, 1 had children, while 2 others subsequently had abortions.

Donald² finds his operative mortality only 1 per cent in private cases and a little higher among hospital cases. The treatment, in that it is radical and not simply symptomatic, must take precedence over the conservative methods.

The year has seen the usual crop of articles dealing with **X Rays**, **Radium**, and **Mesothorium** in the treatment of uterine diseases, and more especially of myomata, cancer, and uterine hæmorrhage. In almost all instances the articles are favourable to the treatment under certain specified conditions, such as cases over the age of forty and uncomplicated cases of fibroids, while for those of cancer, only the inoperable remain the correct cases for treatment. (*See also pp. 60, 63.*)

Myomata.—Stern,³ using massive doses of x rays in myomata, and excluding unsuitable cases, would claim almost 100 per cent successes. The dangers with proper technique are nil. For permanent amenorrhœa he advises the massive dosage; but in young people in whom it is desired to get a re-establishment of menstruation, only the fractional dosage should be employed. He records two cases in which the latter method was used, and in which subsequent conception was followed by normal labour and healthy children. The nearer the patients are to the climacteric, the surer and quicker the treatment.

Gauss,⁴ at the 1914 meeting of the British Medical Association, gave recent figures of successful treatment at Freiburg, involving some hundreds of cases, but also including conditions indefinitely classified under the heading 'metropathy.' The term cure as used in this abstract is simply cessation of hæmorrhage, and no mention is made of the tumour condition after treatment. Consequently, the comparison of results would be between a symptomatic cure on the one hand and a radical operative cure on the other.

Kelly,⁵ restricting his treatment to the use of radium, continues his list of successful results in fibroids. Thirty-six cases have now been successfully treated up to date. Both amenorrhœa and shrinkage of the tumour resulted in most cases, and no malignancy has as yet been encountered.

Pfahler⁶ reckons that between two and three thousand cases have probably been treated. The indications, dangers, and results are fully considered in the course of the paper.

Frank,⁷ having had a considerable experience of treatment by x rays, tries to arrive at a just appreciation of their applicability. An important point which he makes is that the mortality in operative treatment of fibroids is to be found chiefly among those cases of

complicated fibroids, sloughing pedunculated fibroids, malignant fibroids, or those in which hæmorrhage is so severe as to negative delay in cessation of bleeding that must ensue under Röntgen therapy, in all of which it is pretty generally agreed that the more conservative treatment is not to be recommended. In uncomplicated cases the operative mortality is 0.75 per cent, while that attending Röntgen therapy is given by Muller (Freiburg) as theoretically 0.63 per cent. However, where operation is declined or contra-indicated, the x rays are invaluable. (*See also p. 63.*)

Prolapse.—Jellett⁸ describes the ligaments at fault in the various forms of prolapse in the female pelvis, and suggests the correct method of countering these errors. Clinically, each case must be judged on its merits and treated according to the structures on which has fallen the pathological strain, or which are in abeyance. In his opinion, reconstitution of the perineum is one of the most important factors in the production of a successful result in operative treatment.

C. H. Mayo,⁹ in bad cases of prolapse, after performing vaginal hysterectomy, sutures the two broad ligaments together, and then, catching up the two round ligaments, fixes the whole under the bladder, for which it forms a firm support. He then closes the wound in the vagina with a continuous catgut suture. In association with this operation, he invariably performs an extensive firm perineorrhaphy.

Fothergill¹⁰ describes his routine operation for cystocele and prolapse of the cervix, when a single incision, starting in the vagina just posterior to the point corresponding to the internal meatus of the bladder, proceeds backwards and laterally round the cervix to return to the original point, thus outlining a cone-shaped area from which the vaginal mucous membrane, together with the circularly amputated vaginal cervix, are removed. The union of vaginal mucous membrane to the edge of the previously dilated and amputated cervix is then commenced in the posterior part, and results in carrying the cervix high up and well back in the pelvis, to such an extent that there is no retroversion and consequently no need to ventrofix. A perineorrhaphy is considered advisable at the same time.

Nyulasy¹¹ suggests the following original operation for retro-displacements: On opening the abdomen, the broad ligaments are incised longitudinally along their anterior face, and then, by passing a purse-string suture round the edges of the incision so made and eventually tightening it, the uterus is replaced temporarily by the shortened broad ligament. It is hoped that while maintained in normal position by the shortened peritoneum on the anterior face of the broad ligaments, the round ligaments will spontaneously shorten and take on their function of maintaining the uterus in its normal position.

REFERENCES.—¹*Amer. Jour. Obst.* 1914, ii, 747; ²*Brit. Med. Jour.* 1914, ii, 530; ³*Amer. Jour. Obst.* 1915, i, 396; ⁴*Brit. Med. Jour.* 1914, ii, 530; ⁵*Surg. Gyn. and Obst.* 1915, i, 271; ⁶*Amer. Jour. Obst.* 1915, ii, 79; ⁷*Ibid.* 408; ⁸*Dublin Med. Jour.* 1914, 161; ⁹*Surg. Gyn. and Obst.* 1914, i, 253; ¹⁰*Amer. Jour. Surg.* 1915, May, 161; ¹¹*Lancet*, 1915, ii, 230.

UTERUS, DISPLACEMENT OF. (*Vol.* 1915, *p.* 669.)

VACCINATION.

E. W. Goodall, M.D.

The usual methods of making vaccine lymph which are in vogue at present do not succeed in freeing the lymph entirely from extraneous micro-organisms. Noguchi¹ has devised a method of producing and propagating a pure uncontaminated vaccine. It is rendered pure by treating it with suitable disinfecting agents, and is then propagated in a pure state in the testicles of rabbits and bulls. Its activity is equal to that of strains obtained in the usual way by inoculating the skin of calves.

REFERENCE. —¹*Jour. Exper. Med.* 1915, xxi, 539 (quoted in *Brit. Med. Jour.* 1915, ii, 447).

VACCINES.

O. C. Gruner, M.D.

Standardized Employment.—The use of autogenous vaccines is usually considered more satisfactory than that of stock vaccines. This is probably due to the fact that a full bacteriological examination of the material in a given case cannot be conveniently carried out, owing to difficulties of isolation of more than two or three varieties of organism; hence a single stock vaccine does not deal with all the organisms present.

Lyon Smith and Cassels Brown¹ give the results obtained by another method of investigation. It is based on the fact that when blood corpuscles, washed free from fibrin and serum, are treated with emulsions of various bacteria with which the blood has previously come in living contact, hæmolysis occurs with them and no others. They give a list of twenty-five different organisms with which they have worked. Briefly, the procedure consists in testing the blood of a patient against any number of these strains, in order to determine the presence or not of hæmolysis. The greater the hæmolytic reaction, the greater proportion of that bacillus or coccus that must be used in the subsequent treatment.

Minute test tubules (30 × 3 mm.) are arranged on plasticine, and numbered. Each receives 0.1 c.c. of 5 per cent emulsion of the patient's corpuscles. To successive tubes is added 0.1 c.c. of bacterial emulsion from the stock series. The series is then incubated for ten minutes. The tubules in which hæmolysis has occurred are noted. The incubation is repeated in a further ten minutes, and so on up to one hour. In this way the degree of hæmolytic power is estimated at the same time. A control with carbolized normal saline is needed, as a guide to variation of hæmolysis due to the salt contents of the blood. The quantity of blood required from the patient is 2 or more c.c. It is at once discharged into citrated saline (NaCl 0.69 per cent, citrate 1 per cent), then it is centrifuged, and the citrate removed with a pipette, to be replaced by normal saline to the requisite volume.

Graded quantities of vaccine, perhaps of six or seven different kinds, will be prescribed according to the results.

REFERENCE.—¹*Lancet*, 1915, ii, 279.

VARICOCELE.

W. I. de C. Wheeler, F.R.C.S.I.

The operation of excision of the veins of the pampiniform plexus can be best performed under local anæsthesia. The constituents of the cord are more easily identified and the small deferential veins saved from injury. The skin is first infiltrated with 1 per cent solution of novocain and adrenalin along a line lying directly over the external abdominal ring. The fascial coverings of the cord forming the sheath come into view after division of the skin, and these are in turn infiltrated with one insertion of the needle. The introduction of the novocain 'balloons' the sheath, which is then divided and held apart with light forceps. The veins are now clearly exposed, and are gently separated from the vas and deferential veins and artery, all of which can be clearly seen. The operation is completed in the usual manner.

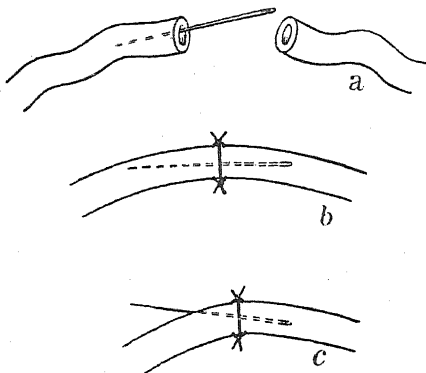


Fig. 53.—Anastomosis of the vas deferens. Showing how a small needle acts as an aid to end-to-end union and ensures patency of the lumen (Wheeler).

Occasionally the vas deferens may be divided accidentally, or its division may have been a necessary part of an operation on the cord; an end-to-end union can readily be accomplished in the manner illustrated (Fig. 53).

VARICOSE VEINS. (*Vol. 1915, p. 675.*)**VERRUGA PERUVIANA.**

Sir Leonard Rogers, M.D., F.R.C.P.

Richard P. Strong and E. E. Tyzzer¹ record experiments with the virus of this disease. They had previously reported the successful inoculation of monkeys through the skin. On rubbing a verruga nodule into previously abraded skin over the eyes, after an incubation period of ten to twenty days, small papules appear which gradually enlarge to resemble the human lesions, including the microscopical changes, without any appreciable fever. After four or five weeks the lesions fade away. Inoculation of the virus into the testicle of a rabbit produces a fairly characteristic low inflammatory circumscribed nodule, with attenuation of the virus. Cultures on various media were unsuccessful. Filtering the virus rendered it non-infective for rabbits; but monkeys could not be obtained for this experiment, so it is inconclusive. Nodules from monkeys so treated failed to infect other monkeys. They compare the disease to small-pox in its nature, which shows a slight analogy. In a further paper²

on the pathology of the disease, they describe the histological changes, which may resemble either a sarcoma, myxosarcoma, or angiomas. No organisms were found. They think the disease which has been described as angiofibroma contagiosum is probably verruga.

C. H. Townsend³ records two years' investigation of verruga in Peru. After describing the disease and its distribution, and pointing out that the infection takes place at night, he shows that in the infective areas *Phlebotomus verrucorum* swarms, and is the only insect which could carry the infection, while it bites at night. Experiments were carried out in a highly-infected spot, both by allowing the sand-flies to bite and by injecting their ground-up bodies subcutaneously into monkeys, dogs, rabbits, and guinea-pigs. In several of the dogs, fever, with the appearance of bacilliform bodies in their red corpuscles and eruptions of nodules away from the site of the injections, resulted. A monkey exposed to the bites of the insects developed fever and the typical rash. One of his European assistants contracted the disease through being bitten through his mosquito curtain, suffering from prolonged fever, with Barton's bodies in his red corpuscles, followed by the typical eruption. A sailor bitten by sand-flies from the infective area also developed some symptoms resembling the disease.

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1915, i, 1124; ²*Ibid.* 615; ³*Ibid.* ii, 16.

VULVA, DISEASES OF.

Bryden Glendining, M.S., F.R.C.S.

Oliver¹ records recovery after Radium treatment in a case of cancer which recurred after previous excision of the vulva. The case was apparently cured, but the evidence is not quite conclusive.

Eyraud-Dechaux,² in an extensive memoir, goes into some detail concerning the clinical forms, pathology, and treatment of *pruritus*. When faced by a condition of *pruritus* of the vulva, the following should always be borne in mind as perhaps responsible: (1) Locally, the itch mite; certain medicaments, more especially some of the modern perfumed soaps; oxyuris; vesical calculus; hæmorrhoids; herpes; and finally, discharges from the genital tract. (2) General conditions such as pregnancy, menopause, diabetes, and leukoplakia. The treatment beyond that adapted to the cause should also involve an attempt to allay the irritation by applications of Heat, best done by sponging with water to which a little vinegar has been added, and applied on cotton-wool as hot as bearable. If successful, a little **Talc Powder** may afterwards be dusted on, or an ointment applied consisting simply of **Zinc Oxide** or of **Cocaine** or **Morphia**. The treatment for the amelioration of the local condition should contain innocuous ingredients, especially in the presence of inflammatory changes. In exceptional cases, which resist all ordinary measures, surgical means may be necessary in order to bring relief.

Bulkeley,³ while bringing to notice a case of *tuberculous ulcer* of the vulva, has collected all the recorded cases, seventy-two in

number, and has supplied an exhaustive monograph on the subject. The interest centres chiefly in the prognosis, as the immediate and remote mortality in the cases recorded stands at 43 per cent; but the results are probably even less favourable, as the majority of cases exhibit the symptoms and physical signs of pulmonary lesions, which progress after the patient has passed from the hands of the surgeon. All cases which died showed lesions in other parts of the body, even though local vulval lesions were healed. Palliative measures were generally found unsuccessful, and the alternative of something more radical was necessary. The best chances would appear to follow an **Excision** under aseptic conditions, using the knife and including a considerable circumferential area of healthy tissue, and also including the lymph-glands of the inguinal region where these are to be recognized as involved. Many surgeons, however, prefer removal by means of the cautery. Scraping and localized cauterization which fail to eradicate the lesion are to be condemned.

REFERENCES.—¹*Lancet*, 1915, ii, 272; ²*Rev. de Gynécol.* 1914, June, 493; ³*Amer. Jour. Med. Sci.* 1915, i, 535.

‘**WHITE SPOT**’ DISEASE. (See MORPHEA GUTTATA.)

WHITLOW. (See PARONYCHIA.)

WHITMORE'S DISEASE. (See MORPHINE INJECTOR'S SEPTICÆMIA.)

WHOOPIING-COUGH.

Frederick Langmead, M.D., F.R.C.P.

TREATMENT.—The number of drugs which are advocated for the treatment of whooping-cough is sufficient evidence of the absence of any of acknowledged therapeutic value. Graham¹ divides them and other measures employed for the condition into two groups: (1) Those which *per se* have a tendency to lessen the number and severity of the paroxysms; and (2) Those which are directed to the treatment of the complications. Most attention has been paid to the members of the first group. Of these perhaps none is more accredited with usefulness than **Belladonna**. Graham prefers the tincture, beginning with 1 min. three times a day, and increasing the quantity by 1 or 2 min. daily, until mild pathological effects of the drug appear, after which any further increase of dose must be used with caution. **Antipyrin** is often administered in considerable doses. Graham considers that for a child of two years, 2 or 3 gr. each night, or morning and night, is as much as it is wise to employ. **Bromide of Sodium** 5 gr. three or four times daily, to a child of three years, is often of benefit; whilst **Codeine**, **Trional**, **Heroin**, and **Chloral** often allay cough and induce sleep if given either as a single dose at bed-time, or, if necessary, two or three times daily. **Quinine** in large doses is believed to reduce the number and also the severity of the attacks. Since it is not an antispasmodic, any such effect, as Graham points out, must be due to its action upon the causal organism. The

lactate may be injected intravenously or intramuscularly with benefit, but its action is more prompt and more satisfactory by the intravenous method. The same is true of **Hydroquinine**, which has also been used as a prophylactic with favourable results. No disagreeable local or constitutional symptoms follow either the intravenous or intramuscular injections.

The form of modern treatment to which most attention has been paid in the literature of the last few years has been that by **Vaccines** prepared from cultures of the Bordet-Gengou bacillus. Graham regards them as a distinct addition to the treatment, and also as of some use as a prophylactic. For a mild case he holds that the vaccine treatment is unnecessary, but for more severe ones it is often of distinct value. As a prophylactic measure, its power needs to be tested carefully in a large number of cases. Hartshorn and Moeller² have reviewed the literature on this subject. According to them, 1445 cases have been reported, but there is no universal endorsement of its value. A variety of vaccines are being used without definite knowledge of the bacteriology of the individual cases treated. There is a striking lack of negative reports. Apparently the vaccine is harmless in uncomplicated cases. There has been established no definite standard for dosage or for treatment, and generally the dosage has been apparently too small. The course of the disease in the majority of cases reported has not been much under six weeks. Its value as a prophylactic agent is still undetermined. It is generally conceded that the earlier the treatment is given the better the result. These authors have treated eighteen cases with vaccines, and conclude that a certain number respond favourably to a commercial vaccine. When this proves inefficacious they recommend the trial of an autogenous vaccine. The initial dose, they consider, should be at least 50 million bacilli in older children. In that the improvement in a few cases was immediate and striking, they deem it advisable for the practitioner to suggest, but not to recommend, its use.

Paul Luttinger² recounts his experience with vaccines from various strains of organisms. These were used hypodermically. At the beginning an initial dose of 50 million organisms was given, and this was doubled every three or four days. Later the initial dose was increased to 250 million, and was doubled every other day provided that there was no reaction. For prophylactic purposes only three injections of 500 million, one billion, and two billions respectively, were administered every three days. Altogether nearly 3000 injections were given; no severe reaction was ever encountered, although malaise, headache, and a slight rise of temperature, ascribable to gastro-intestinal or other causes, occasionally occurred. According to this author, there is absolutely no danger from anaphylaxis. Of the preliminary series of 107 cases, the notes of 45 only were complete enough for purposes of record. They were benefited only slightly, if at all, by vaccine treatment. The remaining cases of the series in which vaccines were used for the developed disease were some-

what discouraging. As a prophylactic measure, 24 received vaccines. One of these refused the full treatment. Of the remaining 23, no patient contracted the disease. A control case was given an injection of alcohol and whooped a fortnight later. The experiment loses some of its significance, however, on account of the lack of information regarding the exact time of exposure, and probably some were naturally immune to the disease. Further cases were investigated at a whooping-cough clinic. Of these, 76 cases treated by drugs, usually by an antipyrin and bromide mixture, were compared with 138 cases treated by vaccines. The number of injections exceeded three in only a few instances. The vaccine treatment seemed to decrease the paroxysmal stage by over two weeks. What was more significant was the prompt amelioration which followed the vaccine in nearly all the cases. The whoop became milder except in the case of a few patients in whom a moderate reaction followed the first injection; in them a slight aggravation took place after twenty-four to forty-eight hours. The usual course after vaccine treatment was : (1) Decrease in the severity of the night paroxysms ; (2) Cessation of vomiting—amelioration of the day paroxysms ; (3) Cessation of the day paroxysms ; (4) At the end of the first week of treatment, reduction of the whoops to about 25 per cent of their former number. The cases treated by antipyrin, as a rule, showed first a decrease in the number, but not in the severity, of the paroxysms. Vomiting was apt to continue as long as, or longer than, the whoop. Both were liable to return as soon as the medicine was withdrawn, or on the least provocation, due to cold, gastro-intestinal trouble, etc. Such relapses were rare after treatment by vaccines. Four so treated developed pneumonia, of whom three recovered. Since one-third of the vaccine patients were less than one year old, the incidence of this complication was slight. Nine children who had been exposed to the disease were treated prophylactically, and none developed it. Luttinger draws the following conclusions : (1) Pertussis stock vaccines, as prepared for his use, seem to have a prophylactic value when given in large doses ; (2) In the treatment of the disease these vaccines seem to have shortened the duration and lessened the severity of the paroxysmal stage, the average duration of the whoop being twenty-five as compared with forty days in the cases treated by drugs ; (3) Further experiments with a view to obtaining more effective vaccines and a closer co-operation of the profession in public health education may help in the eradication of the disease.

Alfred F. Hess⁴ has had the unusual advantage of studying an epidemic within the confines of an institution. A better judgement as to the value of vaccines could be arrived at under these circumstances, since the infection was probably from the same source, the conditions were similar, and the onset of the illness could be determined with accuracy. For prophylactic reasons, 244 patients were inoculated with four different vaccines, one of which was prepared from three strains of the typical Bordet-Gengou bacillus, isolated

from cases included in the epidemic. Of the 244 patients, 20 developed pertussis. Among them were included 3 of 58 children who had been treated with the autogenous vaccine. No vaccination was given in 80 children whose risks of becoming infected were otherwise comparable, and of these 59 developed the disease. Prophylactic treatment on a large scale was not instituted until the beginning of the decline of the epidemic, and thus the diminished incidence of infection among the vaccinated may have been partly explained by a diminished virulence. Moreover, ordinary methods of prevention were more strictly enforced during the progress of the epidemic, and were more in evidence during the period when the vaccines were being used. Yet the disparity between the proportions of vaccinated and unvaccinated children who became infected was so great that Hess is of the opinion that the vaccine was of value in preventing infection and limiting the epidemic. The therapeutic effect of the vaccines was not so satisfactory. Of 85 cases which constituted the epidemic, 65 were treated with vaccines and 20 were not. No other treatment was employed. The 20 severest cases were then selected, and it was seen that of these only 2 had received no vaccine treatment whatsoever. The use of vaccines did not lessen the severity of the disease, and when a prophylactic vaccine had been employed, if it failed to prevent the disease its severity was not mitigated. All attempts to use vaccines for diagnostic purposes proved futile, whether as a cutaneous, intracutaneous, or subcutaneous test.

REFERENCES.—¹*Jour. Amer. Med. Assoc.* 1914, ii, 1053; ²*Ibid.*; ³*N. Y. Med. Jour.* 1914, i, 1043; ⁴*Jour. Amer. Med. Assoc.* 1914, ii, 1007.

WOUND INFECTIONS. (See special article, p. 669.)

Colloidal Gold injected into veins or muscles recommended by Belbèze (p. 14). **Serum** of Leclaine and Vallée (p. 30). **Auto-inoculation** (p. 38). **Electrotherapeutics** (p. 64).

YAWS.

Sir Leonard Rogers, M.D., F.R.C.P.

E. J. Wood¹ reports on the occurrence of yaws in the United States. The disease was probably brought to the West Indies by the African slave trade. He thinks it has frequently been overlooked in the Southern States through confusion with syphilis. Monkeys are easily infected with yaws, and the lesions do not show the giant cell of syphilis. This paper includes an extensive bibliography. A. Garrow² and D. de Vos Hugo³ discuss the question of syphilis or yaws in South Africa, the former maintaining that the cases under discussion were syphilis, and the latter that they were yaws. Both agree that further investigation is advisable to clear up the point.

P. H. Bahr⁴ notes on the distribution of yaws in Ceylon and its tertiary manifestations. The infection is rare in the hills, where syphilis prevails. He describes as tertiary symptoms of yaws, acute and chronic periostitis, osteitis, epiphysitis, synovitis, ulceration of a gummatous nature, and gangosa.

R. Howard⁵ also writes on the importance of tertiary yaws as seen by him in Central and East Africa. Many of the cases are returned as syphilis. In many parts of Central Africa quite 50 per cent of the natives have suffered from yaws, so this disease should be excluded before tertiary syphilis is diagnosed. The natives themselves recognize the difference between the two diseases. **Potassium Iodide** gave very satisfactory results in the treatment, and the news of its success soon brought large numbers of patients to the hospital.

TREATMENT.—A. Castellani⁶ gives a note on the internal treatment of yaws when intravenous **Salvarsan** is not available. His mixture contains **Tartar Emetic** 1 gr., **Sodium Salicylate** 10 gr., **Potassium Iodide** 1 dr., and **Sodium Bicarbonate** 15 gr., in one ounce of water, diluted in four ounces of water, thrice daily. The results were very satisfactory in fairly recent cases, but not to be compared with salvarsan in old ones. E. C. Spear⁷ also records the successful treatment of three cases of *sprue* with Castellani's mixture.

REFERENCES.—¹*Amer. Jour. Trop. Med.* 1915, Jan. 431; ²*S. Afric. Med. Rec.* 1915, 89; ³*Ibid.* 107; ⁴*Ann. Trop. Med.* 1915, Jan. 675; ⁵*Jour. Trop. Med.* 1915, 25; ⁶*Ibid.* 61; ⁷*Ibid.* 170.

Part III.—Naval and Military Surgery.

THE MEDICAL OFFICER AND THE FIGHTING-MAN :

A GENERAL REVIEW.

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IN compiling the following notes an attempt has been made to glean from the medical literature of the year and from personal experience those points and suggestions of most practical importance in the study of the relationship between the medical officer and the fighting man.

RECRUITING.

In normal times the physical standard for recruits for Army and Navy varies with the requirements of particular branches of the services. Some corps, either from prestige or from practical necessity, insist on certain standards of uniformity, which may vary in a small degree with the supply. But with the exception of vision, these variations are limited to age and to physical development, i.e., height, weight, and chest measurements. Physical defects and deficiencies, with the exception of repairable teeth, require the rejection of the candidate. For the long-service ratings of the Royal Navy the highest standard is enforced. Vision must be full-normal, as determined by Snellen's test-types, for all the seaman class, while a slightly lower vision standard is allowed for stokers.

No doubt in the early period of the war the strict adherence to the exacting regulations of Army recruiting caused the rejection of many men whose age or minor defects in no way affected their efficiency as short-service soldiers; but although this caused much discontent, and to some extent damped the ardour of recruiting, it was evident that no wide relaxation of rules could be made until arrangements for accommodation and training of the New Army were perfected. With this relaxation came the difficulties of newly-appointed medical recruiting officers whose inexperience of service conditions hampered their discrimination of the importance or otherwise of minor defects. It is not surprising, therefore, that the invaliding-lists show that a considerable weeding process followed upon the recruiting at this period. With further experience the difficulties have been overcome; the essentials having been recognized, professional common sense moderated the rigidity of the regulations. Facilities have been

organized to enable would-be recruits to have minor defects remedied by operation, and for free dental treatment, extended in some cases to free dentures.

Lack of system in the examination routine probably accounts for most of the glaring deformities that from time to time escape rejection. A fixed routine of examination, grouping various organs and parts, and following the same order in every case, will avoid humiliating oversights. Time can be saved if the commonest causes of rejection are known, and these defects or deficiencies looked for early in the routine examination. These are, with the exception of organic diseases and under-development, now to be considered in brief detail.

Defective Eyesight.—The ability to distinguish the letters of Snellen's test-types at the standard ranges is accepted as proof of satisfactory vision. It is by no means a satisfactory test. When positive it is no guarantee that the structure of the eye is normal, and that good vision may be lasting. In the robust, accommodation may overcome surprisingly high degrees of ametropia, which become manifest under the stress of arduous conditions. This is especially noticeable in the Navy in the signalmen ratings. It is also a test that can be fairly easily 'dodged' by a clever candidate. When negative, the inability may be due to insufficient or badly-arranged illumination, or to pressure on an eye while excluding the sight during examination of the other, or even to simple eye-weariness after a long day's work, for many candidates elect to enlist on a Saturday, and not a few fortify themselves for the ordeal to an extent verging on diplopia. Moreover, failure to pass the test reveals nothing as to the cause of the inability. A small degree of astigmatism may be more troublesome to the candidate in defining certain letters of the types than a higher degree of hypermetropia. Contrary to general acceptance, such astigmatism does not very materially affect the soldier's shooting efficiency, for in aligning the rifle sights vision is strictly central, and in effect eliminates the ametropia, as in the well-known 'pin-hole' test. The writer has found many expert rifle shots, using the service rifle with unaided eye, to be under standard vision by reason of astigmatism.

Examination by ophthalmoscope is obviously impossible in recruiting examinations; but there are, no doubt, many cases where an otherwise eligible recruit fails to come up to the regulation standard, when an exact knowledge of the cause may influence decision. In cases where eye fatigue is suspected, a further trial under more favourable conditions might be given.

In mining districts the prevalence of *nystagmus* should be remembered—a condition to be rigidly rejected, and one easily overlooked, especially if the examiner is at a distance from the candidate, pointing out types, while an assistant alternately covers each eye. The converse arrangement should be made.

Inefficient Teeth.—Considerable latitude is allowed, providing repairable teeth are opposing. Dentures are provided only in special cases where the candidates are otherwise particularly desirable; but in all

cases judgement is influenced by the general nutrition, presence or absence of sepsis, dyspepsia, etc.

Varicose Veins must be rejected even in minor degrees. This is not a defect that is improved by training.

Varicocele, if small and unassociated with varicose veins of the legs, or with hæmorrhoids, need not cause rejection.

Hernia is often difficult to detect. It should be looked for at the period of examination when the candidate has been put through the muscular exercises for testing the flexibility of the joints and the spine. Reject all cases.

Deformities of the Feet.—Minor degrees of flat-foot are improved with physical training, and may be passed if there is ability to walk on tip-toe, and if there is no actual convexity of the sole. Ingrowing toe-nails, hammer-toes, hallux valgus, should all be rejected. Slight degrees of hammer-toe, if there is no sign of corn on the first phalangeal joint, or on the extremity of the toe, and if there is no overriding, may, perhaps, be accepted if the candidate has been accustomed to heavy outdoor work. Cases of spastic paralysis are not infrequently mistaken for hammer-toes.

Glandular Enlargements and Diseases of the Ear require rejection.

It is an encouragement to the candidates rejected for minor defects which can be remedied by operation, to be told that such disabilities as varicose veins, varicocele, hammer-toes, ingrowing toe-nails, etc., can be removed under local anæsthesia.

Deficient Chest Measurement.—The degree of expansion is the most important of chest measurements. A high minimum chest measurement may be associated with emphysema, and is not uncommon amongst recruits who have had previous military service.

The question of the minimum height is less a matter of physical fitness than general efficiency. The argument that since the Japanese, a race of short stature, have proved themselves exceptional soldiers, 'Bantams' should prove satisfactory, may be sound on physical grounds; but the disadvantage of a wide departure from an average standard may be acute in certain circumstances, particularly in the trenches, when the very short may have to occupy trenches made to accommodate the very tall, or vice versa.

IN CAMP.

In addition to the duties of medical officers in connection with the sanitary arrangements of camps and the general medical supervision of recruits, particular attention is directed to the foot-gear and to the condition of the soldiers' feet. The boots supplied to the British Army are reputed to be of exceptionally good quality, both as to material and manufacture. The regular troops are kitted with two pairs drawn from stock sizes or, if necessary, made to measure. On active service the soldier does not carry his spare boots—a supply is carried by the regimental transport, and further supplies are stored at the base.

The *Points of the British Army Boot* are : (1) Soles of double layers of leather protected with nails ; (2) Reinforced 'waist,' to give stability ; upper heel reinforced for better wear ; (3) Lower heel low and protected with iron tip ; (4) Vamp of soft leather continuous with the tongue and roomy over the toes ; (5) The back part of the upper is stiff and close-fitting about the heel, and pliant around the ankle ; (6) Edges of seams turned outwards ; (7) Leather laces. In fitting boots extreme care is required, since this is one of the most important factors in the efficiency of the soldier. Many recruits of to-day are drawn from classes unaccustomed to heavy foot-gear, and difficult to fit with stock sizes. The fitting should be made after a long march. Thick or double socks should be worn at the time, and the fit should be thoroughly tested by walking. There should be plenty of room in the fore part, and a close fit round the heel, and almost, but not quite, as far as the toes. The sole should be pliant, with a good welt. The lacing should not quite meet, so as to allow for variations of sock or conditions of the feet. The boot must not be high enough to interfere with the ankle movements. There should be allowance for shrinkage by wet. Stress is laid on the softening of new boots with castor oil and keeping them in condition with 'dubbing.' Ill-fitting boots not only incapacitate the soldier while marching, but are a predisposing cause of frostbite and trench-foot.

Socks should be shrunk, and not tightly fitting, and frequently changed.

Blisters of the Feet arise from accidental conditions due to ill-fitting foot-gear, or from vasomotor conditions, the result of cold and wet combined with pressure. *Preventive treatment* consists of frequent rubbing with a 2 per cent solution of salicylic acid in spirit ; painting with saturated solution of picric acid, or a solution of chromic acid, 2 to 3 gr. to the oz. ; soaking the feet in a solution of permanganate of potash, or alum, or raw salt ; or powdering the feet with talc and salicylic acid (2 gr. to the oz.—Webb-Johnson). For *sweating feet*, formalin 1-800 solution is advised.

Epidemics in Camps.—*Cerebrospinal fever* has been prevalent in the camps and naval military centres at home. Rolleston deals with this subject. The disease is spread by carriers unaffected themselves or recovered from the disease, and by sufferers detected or undetected. Some carriers are believed to be periodic. Unaffected carriers may themselves develop the disease, which upsets calculations as to incubation. Abortive cases of cerebrospinal fever are mistaken for influenza, and spread the disease : a point to be remembered during epidemics of catarrhal affections. While all men of service age are liable to infection, the majority of cases occur below the age of twenty years. Recruits are exceptionally susceptible, probably on account of lowered resistance from a combination of depressing factors, including excessive fatigue and the after-results of antityphoid inoculation and vaccination. The chief *preventive measures* are : (1) In catarrhal epidemics, frequent bacteriological examinations of throat

secretion of the most seriously affected, for possible carriers ; (2) The invaliding of all recovered patients, so as to avoid intermitting carriers ; (3) The avoidance of overcrowding, enforcing the proper use of all ventilators ; (4) Tempering the work of the recently vaccinated and inoculated to avoid susceptibility from over-fatigue ; (5) Prohibiting the common use of towels.

When the disease has appeared, the usual preventives against the spread of infectious disease are taken. All indoor contacts are inspected, their secretions examined bacteriologically, and the catarrhal contacts are separated from the others. **Antimeningococcic Serum** injected intrathecally alone has proved disappointing (naval cases). Combined with autogenous vaccine hypodermically, or with **Soamin** in intramuscular injection, the results are encouraging.

Vaccination.—The vaccination or revaccination of recruits should be performed with every attention to surgical cleanliness, during the operation and after. The punctures or scarifications should be moderate in area, the site well protected, and the subjects inspected daily for a fortnight. With strict attention to details the sick list from vaccinia can be kept under 2 per cent.

Minor Ailments.—Prompt treatment in camp or in the isolated pickets along the lines of railway communication is of the utmost importance. Such are constipation, sore feet, minor injuries, sore throat, diarrhoea, and teeth sepsis. The common cause of most of these troubles will be found in the insanitary condition of utensils, the position and condition of latrines, and the want of care in the disposal of refuse. The storage of food will require supervision, or it will be kept in most unsuitable places, exposed to flies and dust. Dishes, dish-cloths, utensils, and water-bottles of recruits are not likely to be properly cleaned and scalded, unless the medical officer is an energetic inspector of nuisances.

ACTIVE SERVICE.

The medical officer's work is constantly breaking new ground. He will be found experimenting in a laboratory, superintending a laundry or a bathing establishment, manufacturing splints, or perhaps running a cinema show or organizing some other form of amusement for his charges. In the trenches he shares the hardships and danger shoulder to shoulder with the fighting men. He is there still occupied with the prevention of disease, his work varying with the seasons and the climate. The conditions of existence bring strange variations from the recognized symptoms and causes of common diseases, and develop rare if not new forms.

Trench-Foot may be taken as an example of such unaccustomed experiences, when this condition is neither a true frostbite nor a chilblain. The predisposing cause is not necessarily frost. It is found when constriction of circulation is combined with long exposure to low temperatures, i.e., below 40°. This combination exists where wet foot-gear is unchanged for several days, when circulation is impeded

not only by the tight shrunken boots and putties but by physical exhaustion. The symptoms of trench-foot in slight cases are anæsthesia, œdema, sensory changes; in severe cases, cyanosis, marked œdema, blisters, and anæsthesia, going on in the worst ones to gangrene. The same condition may occur in the hands or wherever there is prolonged pressure combined with cold. The preventive treatment is obviously to avoid local constrictions and damp by securing a proper fit of waterproof foot-gear, and to employ every means of keeping up the general as well as the local circulation. Boots and socks should be taken off daily if possible, and the feet rubbed. Socks should be frequently changed. Treatment lies in rest, keeping blisters aseptic, and relieving pain. Gangrenous cases may require amputation as in severe frostbite.

The Immediate Treatment of the Wounded Man is most frequently the application of the service field-dressing by himself or by a comrade, combined with such rough first aid as the application of extemporized splints and tourniquets. The wounded are often inaccessible to other aid. Exposed between the opposing trenches, they drag themselves, if possible, to some protection to await the dark, when some may stagger to the first dressing station, while others are fortunate if recovered by stretcher parties.

In the First Dressing Stations, situated in the rear trenches in dug-outs or perhaps cellars of buildings, the first attention of the medical officers will be required to administer restoratives, to arrest hæmorrhage and remove unnecessary tourniquets, to readjust bandages which are very generally applied too tightly in first aid; to relieve pain, and, when possible, to attempt some sterilization of the wounds and surrounding skin, and to renew soiled dressings. Anti-tetanic serum is injected as soon as possible; but this can rarely be done before the patient reaches the field ambulance station, to which all cases are hurried when opportunity occurs. In transporting the immediate wounded through the trenches the official pattern field stretcher has proved almost useless, as it is too long and too wide. The short fusilier trench stretcher has been designed to meet this difficulty (Aubrey). It is practically a chair. The patient's legs hang down or are slung in straps, while his head and shoulders rest against the chest of the rear bearer.

Field Ambulances.—Further attention is given here to the more serious cases, and on the thoroughness of this early treatment the welfare of the patient may depend. Whatever method is used to attempt to sterilize the wound itself, it is essential thoroughly to cleanse and sterilize the surrounding skin over a wide area, and to sterilize this again and again at frequent intervals. Many bullet wounds will require little else than this thorough cleansing, and spraying with iodine or Cheate's solution; but open and ragged wounds must be dealt with energetically and very early if sepsis is to be avoided. How much can be done in the field ambulances depends on the surroundings, the pressure of work, and many other

factors. The ideal treatment of a possibly infected wound is the removal of all foreign matter; the excision of the whole damaged area, and its sterilization by some agent that affects living tissues to a minimum degree. Such methods are extraordinarily successful in hospital practice when carried out within a few hours of the receipt of injury; but it is impossible to deal thus thoroughly with severe wounds in the advanced stations. Consequently, by some, attempts are made to prevent sepsis by the application of such strong antiseptics as pure carbolic acid, or special powders or pastes of bactericidal qualities proved in ingenious laboratory experiments, but at best a forlorn hope in the field. Others deprecate such chemicals as likely to damage already partially devitalized tissues, checking natural processes, and, in the case of pastes, clogging the outlets of the wounds. These find in solutions of hypochlorous acid a more satisfactory antiseptic, at once extraordinarily powerful, non-toxic, non-irritating, and withal extremely inexpensive. It is made by adding to a solution of bleaching powder (1 oz. of acid in 40 of water) 1 oz. of boric acid, standing, and adding another 40 oz. of water, filtering after standing for some hours with occasional shakings. This solution is known as Eusol.* It forms a solution of hypochlorous acid of about 0.5 per cent. With this, fresh wounds are dressed, and the dressings subsequently moistened without removal. It is also claimed to be of great advantage when sepsis is established. A dry preparation in the form of a powder known as 'Eupad,' which is at present on trial in the Royal Navy, contains equal parts of dry boric acid and dry bleaching powder. The injection of antigangrene vaccine containing the streptococcus and staphylococcus and bacillus of Welch is advised by Sir A. E. Wright, to be given at the first-aid station or as early as possible.

Early treatment, it will be observed, consists of hypodermic injections of many kinds, i.e., morphia, antitetanic serum, vaccines, and anti-shock preparations, such as pituitrin, camphor, ether, etc. The Navy already has an official pattern syringe with spring sheath attached to the coat, which dispenses with a case or box, for use on active service, and the naval service pattern morphia-bottle is fitted with a rubber cap. By using bottles of distinctive shapes many sorts of solution can be carried fitted like cartridges into a belt. A serum syringe could be made in the same style as the naval morphia syringe.

The relief of pain and the treatment of shock require early attention. While most medical officers prefer hypodermic injections of morphia, others are satisfied to place a morphia tablet under the man's tongue.

CASUALTY CLEARING STATIONS.—From the field ambulances the wounded are transferred to the casualty clearing stations. Small motor ambulances have found favour. Holding two or three patients lying down, or four sitting, it is claimed that their low outline allows them to creep close to the firing line without attracting attention

* At present on trial in the Royal Navy.

from the enemy. They are well adapted by lightness, exceptional clearance from the ground, and by power of engine to climb hills and to manœuvre on the muddy roads. A new ambulance for the French Army loads from the side; the frame, supporting four stretchers, rests on two transverse buggy-springs, a system claimed to be superior to the suspension of stretchers on spiral springs.

Owing to the stationary condition of warfare in France and Belgium the casualty clearing stations have assumed a permanent character for which they were not originally organized. Designed to be mobile, without tents, huts, or even beds, and staffed for only 200 patients, they have taken on to a large degree the features of base hospitals. Accommodation is often found in roomy buildings well equipped and staffed. Here operations are undertaken within a very short time of receipt of injury, for although these hospitals retain their primary function as sorting stations, certain cases of early wounded, such as perforating abdominal wounds, chest injuries, and gun-shot fractures of the thigh, stand early transport badly, and are, therefore, retained when possible for a few days before being sent down to the base. Here the majority of the wounded receive the antitetanic injection, and many lives are saved by immediate operations which could not be undertaken in mobile clearing stations; but before any operations are performed, the restoration of the patients from shock and the effects of exposure and rough transport, requires the chief attention of the staff. Fortunately, such restorative measures as saline injections, stimulating enemata, and morphine are usually very rapid and effectual.

From surgical experiences in the South African War it has been generally held that immediate operation for *perforating bullet wounds of the abdomen* is contra-indicated; but the conditions of the present war, or rather the nature of the modern German bullet, give little hope that injuries to the intestines will close by natural means, for this bullet is so balanced that on striking it turns over on its long axis, extensively lacerating the tissues instead of neatly puncturing as in the case of the Mauser bullet of the Boers. Souttar advises immediate operation in all important wounds of the abdomen, under spinal analgesia, so soon as shock remedies have improved the general condition. Extensive resections of intestine are often necessary. The results are claimed to be most encouraging. The same writer calls attention to the frequent absence of the usual signs of perforation of intestines, and advises laparotomy whenever a German bullet has passed across the lower abdominal cavity.

In the early *gunshot compound fractures* of the large bones, immediate operation offers the best chance of good results. Souttar advocates the fixation of long plates to the bones, and claims that the method, which at present finds very few supporters, secures ease and comfort in transport and dressing, without risking extension of suppuration in the bones. The subject of plating suppurating fractures is one of extreme interest. Some French surgeons advise bridged

plaster-of-Paris splints, but there are many and serious objections to their use. A large variety of extension splints have been recently introduced which secure ease to the patient and give access to wounds. Cases treated by Hey Groves's splints, especially the modification of Hodgen's, have travelled from Alexandria to England with a minimum of pain and discomfort. (*See Fig. 54.*)

In extensive *wounds of joints* with implication of main vessels, primary amputation is required. When the patient can be retained for several days, conservative operations are attempted. In the majority of cases treatment in clearing stations is confined to disinfection of the skin, and the removal of foreign bodies and hopelessly damaged bone fragments, with the fixation of the limb on long splints or some other apparatus.

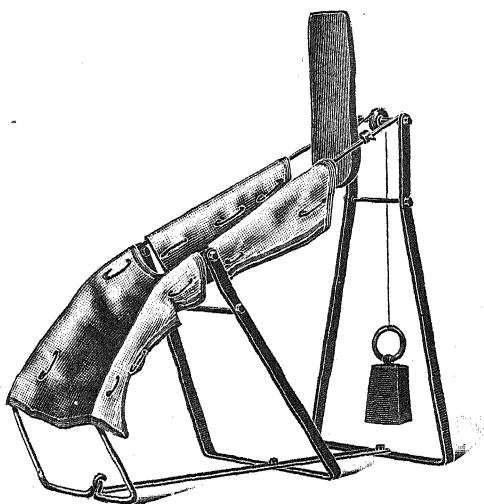


Fig. 54.—Wire cradle leg-splint with slings in position.

In early *head injuries*, extensive operation is not advised, but operation for cleaning wounds or the removal of obvious foreign bodies and bone fragments should certainly be performed, and with great thoroughness, excising the damaged skin and washing away soft herniated brain matter, disinfecting not only the wound but widely beyond it. Severe head injuries are usually kept in the clearing stations for several days.

Of the *perforating chest wounds* that survive to reach the clearing stations, the majority recover, although at first these may be very urgent, with hæmoptysis. Later there may be a rise of temperature and signs of pneumonia along the track of the bullet, with pleurisy and signs of hæmothorax. Empyema is comparatively rare. Operation for the removal of bullets is scarcely ever necessary. These cases are retained for several days before being sent to the base. The

wounds are disinfected, and pain and dyspnoea relieved by morphine and by the sitting position.

Gas Poisoning.—Two principal forms have occurred: (1) Dense fumes of heavy drifting gas released from cylinders (chlorine is the chief constituent); (2) Irritant and asphyxiating gas from shells producing lachrymation and stupor. Apart from asphyxiation, the effects of drift gas may be fatal within a few hours from acute poisoning, later from oedema of the lungs, or after many days from secondary infections of the lungs. The symptoms are intense dyspnoea, burning pain in the eyes, throat, and chest; vomiting of viscid fluid, greenish-yellow in colour; headache, general weakness; and, perhaps, loss of consciousness, sometimes of prolonged duration. In the worst cases of those who survive, the dyspnoea is attended by cyanosis, marked emphysema, with fine râles, cough, and yellow (perhaps blood-stained) expectoration. When spreading infection does not occur, these symptoms clear up fairly rapidly. Precautionary treatment includes helmets or respirators of approved design. Various solutions have been used to saturate the respirator. A solution of sodium hyposulphite has been widely recommended, but is open to objection from the re-formation of chlorine vapour under certain circumstances. Lactic acid has been proposed as a safer solution.

Wounds Infected with Anaerobic Organisms were extremely common during the fighting in the neighbourhood of the Marne, through contamination with the highly manured soil. The emphysematous gangrene resulting from it frequently occurs within twenty-four hours. These cases are therefore amongst those requiring special consideration in the clearing stations. They occur chiefly when there has been extreme tissue destruction. The condition is not confined to the extremities as has been stated. In mild cases the gaseous cellulitis is confined to the neighbourhood of the wound. In severer types the whole limb becomes rapidly swollen, tense, discoloured, and insensitive, crackling with emphysema. The wound is stinking with a cadaveric odour, the secretion varying in colour from dark greenish-red to orange, according to the stage of the disease. Severe constitutional symptoms are present, but the temperature is not high. In mild cases, a thorough cleansing and disinfection of the wound is carried out under an anæsthetic, with removal of damaged tissue and thorough drainage. Oxygen gas is injected subcutaneously. Hydrogen peroxide, permanganate of potash, or hypertonic saline solutions are used for dressing. When distal sensation is lost and mortification is obvious, high amputation without flaps or with open flaps is imperative. An emphysematous condition of the tissues at the seat of amputation does not necessarily affect recovery. Oxygen gas 'played' under light dressing on the surface of the stump through a tube led from a cylinder has proved of practical value. Cases of *tetanus* occurring amongst early wounded are probably of fatal type. Injections of antitetanic serum are given as a matter of routine to every wounded man as soon as possible after receipt of injury; and

when this can be done within twenty-four hours the results in the reduction of mortality are excellent; 500 to 1500 units are given subcutaneously at a distance from the wound.

Early Amputations.—When these have to be performed, the patient's condition is often so serious that a rapid circular amputation dividing the tissues at the same level offers the best chance of saving life. Subsequently re-amputation of the protruding bone will be required. As to the resulting stump, it matters little that flaps have not been designed *secundum artem*, so long as there is no subsequent adhesion of scar to bone, since in the modern artificial limb the weight is not taken on the end of the stump. Indeed, a cicatrix carefully planned to avoid the apex of the stump may be liable to trouble arising from friction with the side of the socket. The advantage of spinal analgesia in these early operations is obvious.

HOSPITAL TRAINS AND SHIPS.—From the clearing stations the majority of the wounded in France and Belgium are transported to the base hospitals by train. These trains may be permanent hospital trains or ordinary passenger trains, or—in times of emergency—improvised cattle trucks. Apart from the fully equipped regular hospital trains, the only satisfactory cars are those which are intercommunicating, fitted with side doors, and having a kitchen car attached. It is most important to be able to feed and attend the cases without the necessity of stopping the train. Arrived at the *base hospitals*, further selection is made in the case of British sick and wounded in the western theatre of war. The less severe are transported to England in *hospital carriers* or *ambulance ships* designed for the rapid transit of casualties for short journeys when little in the way of treatment is undertaken. The capacity of these ships varies from 250 or fewer, to 1200 cases. Many are fitted to take stretchers instead of beds. They ply from bases containing two or more stationary hospitals. The wounded rarely remain on board longer than twenty-four hours. The smaller vessels have proved particularly useful, as they are less dependent upon tides. The larger *ambulance ships* are fast passenger vessels adapted for their special work. The saloons and deck spaces become wards containing from ten to twenty cots of standard type. Lifts convey patients in stretchers to the lower decks. In the still larger *hospital ships* operating theatres are fitted; but in the Channel service only emergency operations are performed. It is interesting to note the number and nature of these emergency operations in the hospital ship *Plassy* during four trips, two from Dunkirk to Cherbourg with French soldiers and two from Calais to Southampton with Belgians (recorded by Fleet Surgeon Rodd); 2033 wounded in all were conveyed, and 32 emergency operations performed, viz., amputations at shoulder-joint 5, through thigh 2, through knee-joint 1, through hip 1, operations on the skull 5, for hæmorrhage 1, enucleation of eye 4, for suppuration of knee-joint 4, gangrenous testis 1, exploration of wounds 10. The *Plassy's* experiences are probably exceptional for Channel passages.

Tetanus occasionally develops during the short journeys, but practically all the wounded have received doses of antitetanic serum before embarking. Many of the cases of extensive septic wounds receive another dose on board. Arrived in England, the wounded are distributed by ambulance trains or by motor ambulances to hospitals in all parts of the country. The majority recover and, after a period of rest at convalescent homes and on sick leave, return to duty. Those who are discharged invalided from the service are helped by aid societies to find employment suitable to their capacities. The blind and the neurasthenic find temporary asylums in special institutions; amputation cases are received into Queen Mary's Auxiliary Hospital, Roehampton, where they are fitted with jointed artificial limbs free of expense.

THE WOUNDED IN NAVAL ACTIONS.

The first cases of naval wounded in the present war were caused by the explosion of enemy marine mines and torpedoes. Many had multiple injuries and were, in addition, suffering from the effects of immersion in water and the inhalation of noxious gases. Later, cases of shell wounds were landed on the east coast after naval engagements, but fortunately the experience of wounds in fleet actions is very limited.

The report on the wounded in the engagement between the *Sydney* and the *Emden* (Surgeon Darby, R.A.N.) gives a very vivid picture of the terrible results of the action, and the extreme difficulties attending the surgeon's work. The organization for the collection and treatment of wounded in the *Sydney* comprised, as is customary, the appropriation of two protected situations—in this case stokers' bathrooms—for operating and dressing stations. Difficulties developed early. The water supply in the bathrooms soon became useless, the water coming through the taps black and muddy. Fortunately another source of supply was available from the galleys. Within a few minutes of the commencement of the engagement, the wounded were being sent down by the unengaged guns' crews, and soon the stream became constant. First-aid dressings were applied and large doses of morphia given. Many of the wounds were multiple and of great severity, some complicated with burns. After first treatment, the cases were removed to other protected parts of the ship. In lowering them down hatchways and ladders, Neil Robertson's stretcher proved most useful. Further attention was paid to serious cases, and salines were given. The engagement lasted from 9.30 to 11.15 a.m. During this time the surgeons were working in a confined atmosphere with the thermometer at 105°. Their work was considerably impeded by the congestion inseparable from the traffic of the ammunition and fire parties. After the action, numbers of the enemy rescued from the water were received in a collapsed state. Until midnight the surgeons were constantly busy. Before that hour their trained attendants were thoroughly worn out. Assistance was then obtained from volunteers,

the surgeons working watches of four hours during the night. Early on the following day operative work was commenced, considerable difficulties having been overcome in reorganizing the work. Arrangements had to be made for the transshipping and reception of some 80 German wounded from the *Emden*, a difficult undertaking in the heavy surf. Although only twenty-four to thirty hours after the action, the enemy wounded were practically all septic and the wounds infested with large maggots. The accommodation of the *Sydney* was taxed to the utmost, every available space being occupied, as there were over 100 prisoners as well as enemy wounded. Operations were carried on under difficulties, volunteers who had never witnessed surgical operations stoically assisting. Meanwhile the trained assistants were dressing minor injuries, and the chaplain looking after the feeding arrangements. Operations were discontinued at noon and recommenced at 6 p.m., continuing until 4.50 a.m. the following day. The operations included amputations, explorations of multiple wounds, and the setting of fractures under anæsthetics. For forty-eight hours the surgeons worked without sleep. On the fourth day the less severely injured of the *Emden* prisoners were transhipped, and on the sixth day, the *Sydney* having reached Colombo, the remaining wounded were sent to hospital. Several days were subsequently occupied cleaning up, scraping, and disinfecting the ship.

In the fleet actions off *Heligoland* on Aug. 28, 1914, and in the North Sea on Jan. 24, 1915, the few wounded were transhipped or landed within forty-eight hours of receipt of injury. In the former engagement the medical officer (Fleet Surgeon Hopkins) of the *Fearless*, a light cruiser, had to deal with 27 cases, of whom 10 were rescued Germans and others received from our own destroyers. Working continuously for thirty-seven hours, he was able to give very thorough surgical toilette with all aseptic precautions to each case, and to accompany them personally to hospital. It is interesting to note that the satisfactory progress of these cases amply repaid the extreme care taken in their early treatment.

The reports of the medical officers (Staff Surgeon Muir and Surgeon Kelly) of the *Tiger*, in action in the North Sea, prove the efficiency of the medical organization in the battleships of this class, and testify to the great value of the Neil Robertson apparatus for removing severely injured from difficult places in the ship. It is evident that when the wounded are not in overwhelming numbers and the protection is adequate, all the essentials of an exacting modern surgical technique can be successfully practised in the larger warships, securing for our wounded sailors a minimum of suffering and a maximum chance of recovery.

In the engagement of Sept. 20, 1914, at Zanzibar, between the light unarmoured cruiser *Pegasus* and the greatly superior *Konigsburg*, the British casualties were 25 killed and 8 officers and 69 men wounded. Two officers and 4 men died later the same day, and 8 men died subsequently. The *Pegasus* was lying a short distance from shore when

attacked. The wounded were conveyed to hospitals immediately after the action. The arrangements for the treatment of wounded during action comprised two collecting stations, situated fore and aft, in the only compartments to which wounded could be transported. The decks of these stations were only four to six feet below the water line. One station was in charge of the staff surgeon, assisted by a cook and stretcher parties, the other in charge of a sick-berth steward, also with a cook and stretcher parties. The crew of each gun was supplied with a bag containing tourniquets, dressings, etc. These bags were attached to the gun shields, and proved of the greatest service in first aid. The ordinary stretchers proved useless. In an interesting report, Staff Surgeon Hewitt draws attention to the small area of the danger zone of bursting high-explosive non-armour-piercing shells, due to the rapidly diminishing velocity of the shell fragments. Many minor wounds of exposed parts were caused by small fragments which would not have penetrated ordinary clothing. The medical officer states that in his opinion "a coat of light chain armour or even leather, with a pair of goggles made from toughened motor screen glass, would be invaluable to captains of destroyers, navigators, and others in exposed positions." Injuries to the eye are present in a large proportion of 'multiple wounds' in naval actions. The fumes of the high explosive powder had "a sickly, stupefying effect." The *Pegasus* was bombarded by non-piercing shell, yet practically every compartment occupied had some casualties except the engine-room and stokeholds, which seem to have been protected by their coal bunkers. From the experiences gained in this action, the medical officer (who was himself wounded) suggests that in unprotected ships, instead of having collecting stations with stretcher parties, more reliance should be given to a wide distribution of first-aid dressings, including iodine solution; also a thorough instruction of the ship's company in first aid. Recent Admiralty instructions recognize the disadvantages of the collecting system in unprotected vessels. Of the 77 wounded in the *Pegasus*, 31 received severe multiple wounds.

Naval Hospital Ships, fully equipped, with appointed operating-rooms and with all requirements, have proved of immense value, receiving cases of sickness and injured, not only from the fleet at home and the near East, but also sick and wounded soldiers. Very many operations are performed in these ships, and the results as seen when transferred for further treatment to the shore hospitals testify to the skill and enterprise of the staff. In a report of the work in H.M. Hospital Ship *Soudan* (Fleet Surgeon Collingwood), is the interesting fact that out of a large number of shell wounds received from ships engaged in action in the Dardanelles the only case of tetanus that occurred was possibly infected by the contents of the sand-bags used to protect the guns on board, and that these sand-bags had been brought out from England.

BASE HOSPITALS.

General Surgical Technique.—We have now reached the third zone of treatment. Tuffier sums up the duties of the zones as follows: "In the first zone, nearest the firing line, the lives of the patients are saved. In the second, limbs are saved, and in the third reparative operations are performed." To this should be added that in the third zone the treatment of septic wounds occupies the chief attention of the surgeon. The large number of *suppurating wounds* that fill the base hospitals bears testimony to the lamentable failure of antiseptics in all cases of extensive tissue destruction where early 'excision of the wound' and removal of foreign material cannot be practised. That this early 'excision' is the most reliable if not the ideal treatment is becoming more evident every day; but it is seldom it can be practised in military surgery. In Naval hospitals where cases are received within a few hours of injury, extensive laceration and compound fractures are treated on 'excision' lines, and these wounds, when the skin can be approximated, are completely sewn up without drainage, with confidence that they will follow the course of ordinary operation wounds if blistering or necrosis of the skin can be controlled, and secondary infection of the wound thereby prevented. This blistering and superficial necrosis has been the only anxiety. Until recently the condition would at times defy all attempts to check it, but in Cheate's rosalan solution (perchloride of mercury in 80 per cent alcohol 1-500 to which is added rosalan 0.1 per cent) has been found a specific which has proved extraordinarily successful. This solution applied to surfaces abraided of cuticle or to edges of wounds, rapidly forms with the serous exudation a hard, horny scab which adheres closely without serum accumulation under it, remaining attached until repair is complete. (See MEDICAL ANNUAL, 1915, p. 710.) When 'excision' treatment cannot be carried out, few shrapnel or shell wounds escape suppuration.

The treatment of suppurating wounds is at present a controversial subject. On the one side are those who aim to kill the infecting organisms with energetic chemical germicides. On the other are those who claim to aid nature in her own methods of dealing with the invasion, by assisting her to produce an uninterrupted lymph osmosis, fearing to introduce laboratory germicides, lest in slaying the foe the friends should likewise perish. Both sides agree on the necessity of free drainage. This should be constant, and can be obtained in no better way than by continuous irrigation by whatever means produced. Both sides agree that a large area of the surrounding skin must be kept disinfected, and that all dressings must be sterile and carefully applied and removed, to avoid injury to granulations and subsequent absorption of septic material. Those who put their faith in powerful antiseptics employ all or any of the Listerian preparations, from an initial application of pure carbolic acid or of strong alcoholic

solution of perchloride of mercury, to attenuated solution of the same, alone, mixed together, or combined with 'mordants' such as malachite green.

When the whole extent of the infected or suppurating cavity is freely accessible—when no burrows, pockets, sinuses, or hidden foreign bodies are present—there can be no doubt this antiseptic treatment is efficacious, but such easily drained wounds do equally well with simple lymph-producing saline dressings, provided the surrounding skin is kept sterile. It is in the deep pocketed wounds that the antiseptic methods prove so disappointing, and it is in this class of suppurating wounds that many surgeons for several years past have used only salines, abandoning all chemical antiseptics, except weak solutions of iodine, solutions which, if antiseptic at all in the Listerian sense, are so mildly bactericidal as to be scorned in laboratory experiments. Possibly they owe their undoubted beneficial action to an assistance in lymph osmosis and a power to mobilize phagocytes. The stigma of empiricism is likely to be removed from this treatment by the investigations of Sir A. Wright, who now justifies with scientific deduction based on research experiments the results so satisfactory clinically, and, by ingenious elaboration of detail combined with the administrations of appropriate vaccines, advances the technique. Others hope to find the ideal antiseptic, i.e., one that is fatal to the foe but fortifies the friend, in preparations containing essential oils, or in ether, or in hypochlorous acid.

In the writer's experience of the numerous septic gunshot wounds received into Haslar Hospital, the most satisfactory results are obtained by avoiding all strong antiseptics. The cases when received (wounded from the Gallipoli Peninsula and Belgians from Antwerp) generally require a very thorough skin toilet, a free outlet for discharges, and sometimes the removal of foreign bodies or necrosed fragments of bone. If, after a good clearing up and free accessibility given to all parts of the wound, under an anæsthetic if necessary, and after a liberal use of hydrogen peroxide followed by normal saline baths or irrigation or hypertonic saline dressings, marked improvement does not begin, the cause is probably found in necrosed bone or overlooked foreign material. The efficacy of hypertonic saline is, in the writer's experience, greatly increased if a few drops of tincture of iodine be added until the solution is pale sherry-colour. It must then be used *immediately*. Purulent discharges often become serous rapidly when wounds are washed out with this mixture. This is, in the writer's opinion, a very valuable 'tip.' It is now a routine practice in this hospital to treat all wounds that show any signs of inflammation with ichthylol and glycerin in equal parts, freely applied to the wound itself and to the whole limb; and in cases where erythema is marked and the temperature suddenly rises, the treatment is kept up for many days after the symptoms have subsided. This treatment has been extended experimentally to less acute cases with encouraging results.

Gunshot Compound Fractures when comminuted do surprisingly well under simple treatment with some form of extension apparatus. During the course of the treatment, it may perhaps be necessary to remove fragments of bone, but generally the greater number of comminutions survive, and callus is rapidly formed. Excellent functional results may be expected when large nerves are not implicated. Such good recoveries are far less common when the bones are fissured; here suppuration extends widely, joints may be involved, and large portions of bone necrose or osteomyelitis sets in. A great variety of apparatus designed to give good access to the wounds while maintaining extension, has been introduced recently. The writer has found the 'Balkan' suspension arrangement in compound fractures of the thigh comfortable for the patients and convenient for the dresser. Hey Groves's modification of Hodgen's splint is simple of adjustment and altogether satisfactory in lesions of the lower leg.

Much ingenuity is being expended upon means for draining wounds, for this is often an exceedingly difficult problem. Rubber drainage tubes are generally unsatisfactory even when corrugated in outline, or split and the convex sides of the halves sewn together; the removal of the drains is often followed by a gush of discharge which has been pent up by the so-called drain. Tubes of spirally twisted wire are coming into favour. The gauze drain is generally condemned because if carelessly used it is too often a plug and not a drain. A narrow gauze ribbon, saturated before inserted, so that its full size is known, will, if the free end is embedded in a mass of dry dressings, prove—when the discharge is thin—a more efficient drain than a tube. Narrow strips of rubber tissue are useful, especially for tendon sheaths and deep wounds of the hand or other sensitive places; but the tissue is apt to break, and portions may be accidentally left in the wound. Suction by Bier's cups or by syringe and tube is, in some situations, the only way to bring discharges to the surface.

Head Injuries bear transport so badly that few early cases are seen in the base hospitals. A surprising number of cases are met with where perforating wounds are free from all after-symptoms, but it is common to have to remove depressed fragments of the inner table of the entrance wounds at any time after the injury for serious headache. Symptoms of localization without apparent injury of the skull call for operation. The wound of entrance is sometimes entirely overlooked. The writer saw one case where a minute scar on the forehead, the site of entrance of a bullet, was believed by the patient to be the result of a mosquito bite. In this case depressed fragments of the inner table necessitated operation long after the receipt of injury. In operating upon intradural cases, the risk of spreading infection is always present.

Explosion Shock from shells or mines is not uncommonly followed by amaurosis, loss of speech, and other functional disorders. Instances are recorded of cure by a succeeding shock, by intoxication, and by the production of ether general anæsthesia.

Penetrating Gunshot Wounds of the Abdomen received in the base hospitals are likely to be survivors of operative treatment in the stations near the front, or cases of fæcal fistula.

Wounds of the Thorax rarely require operation. The large majority of hæmothorax cases clear up without trouble. Empyema is uncommon.

Aneurysms are by no means frequently found, as the results of the injuries from the modern German bullet.

In *Late Amputation of Limbs*, spinal analgesia for amputation of the lower extremity has proved of the greatest possible value, since secondary hæmorrhage or prolonged suppuration, necessitating amputation in these late cases, has often so exhausted the patient that the chances are against his surviving a general anæsthetic. Lockhart Mummery draws attention to the "desirability of the patient being fitted with an artificial limb as soon as possible after the wound has healed," before the wasting of the muscles of the stump has occurred. The site of operation is now chosen with a view to the requirements of the modern artificial limb; generally speaking, the longer the stump the better. Therefore the ordinary 'seat of election' should be avoided. Amputation through the knee-joint is not desirable, as it does not allow a satisfactory joint in the artificial limb.

Injuries to Nerves.—A very large proportion of nerve lesions from bullet wounds tend to recover without surgical interference. When operation is necessary, the nerve is comparatively rarely found to have been severed; more often it is embedded in cicatricial tissues or callus. In nerve repair the ingenious method of enclosing the sutured ends within a short length of resected vein has been adopted. The importance of completely and continually preventing muscle stretching in cases of paralysis from severe concussion or other injury is of paramount importance: a momentary stretching of the muscle may seriously delay the restoration of its functions.

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WOUND INFECTIONS: THEIR BACTERIOLOGY, BIOLOGY, AND TREATMENT.

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Bacteriology.—To understand the bacteriology of the wounds met with in the present war, it must be remembered that the fighting, at all events on the western front, has been taking place on richly cultivated and heavily manured ground. The soldiers spend much of their time in trenches cut into the ground for a considerable depth, and it is impossible to avoid soiling the clothes with earth and mud. Fleming¹ has made a careful bacteriological examination of the clothing of soldiers on their arrival at the base hospitals in France. Small pieces were cut off from portions of clothing, remote from the wound, so that contamination by discharges from the wound might be avoided. Pieces about half an inch square were planted into broth-tubes and cultivated aerobically and anaerobically. The results are set forth in the following table:—

BACTERIOLOGICAL EXAMINATION OF CLOTHING.

(Well-known non-pathogenic organisms such as *B. subtilis* and the like were frequently found, but are left out of the table.)

Sample No.	ORGANISMS FOUND				
	<i>B. aerogenes</i> capsu- latus	<i>B. tetanus</i>	<i>Strepto- coccus</i>	<i>Staphy- lococcus</i>	Other organisms
1	+	-	+	-	Long, slender Gram + bacillus
2	+	+	+	-	
3	+	+	-	+	
4	+	+	+	-	<i>Bacillus X</i>
5	+	+	-	+	Diphtheroid bacillus
6	+	-	+	-	
7	+	-	+	-	
8	+	-	-	-	
9	-	-	-	-	Fine bacillus resembling <i>B. tetani</i> , but with slightly oval spore
10	+	-	-	-	Long, slender Gram + bacillus. Long, stout Gram + bacilli in threads
11	-	-	-	-	Long, slender Gram + bacillus
12	+	-	-	-	Tetanus-like organism with oval spore. Large Gram + bacillus. <i>B. X</i> .

At the beginning of the war two grave complications of infected wounds soon put in an appearance, namely, lockjaw and gas gangrene. Small wonder that the former supervened, when we consider that the tetanus bacillus can be recovered from the clothing in one out of three samples. Similarly with gas gangrene, for the very first batch of cases examined bacteriologically by Weinberg showed that the *Bacillus aerogenes capsulatus* of Welch is the causative agent of this infection, and it is recoverable from ten out of twelve samples of clothing. In fact, it may be said that the bacteriology of wounds is identical with that of the soil and faeces, and, one may add, the skin, for the white staphylococcus is probably introduced into the wound from this source. Fleming gives in the following table the results of his bacteriological examinations of a series of wounds:—

ANALYSIS OF BACTERIOLOGICAL EXAMINATIONS OF A SERIES OF WOUNDS.

Time after Infection	Total No. of Cases	<i>B. aerogenes capsulatus</i>	<i>B. tetani</i>	Putrefactive bacilli		Streptococci	Coliform bacilli	Staphylococci	'Wisp' bacilli	Diphtheroid bacilli	Large Gram + bacilli
				Bac. X	Bac. Y						
STAGE 1— 1-7 days ..	127	103	22	14	5	102	37	40	9	—	2
STAGE 2— 8-20 days ..	56	19	3	4	1	51	18	16	17	4	4
STAGE 3— Over 20 days	27	5	—	—	—	24	19	19	16	—	6

He very rightly insists on the change in the bacterial flora of wounds in the early and later stages. He divides these changes into three stages. The first of these is characterized by a preponderance of anaerobic bacteria, the *Bacillus aerogenes capsulatus* (frequently called *B. perfringens*), *B. tetani*, putrefactive bacilli, coliform bacilli, and streptococci (Plate LI, Fig. A). In the second stage the tetanus bacillus and putrefactive bacilli have disappeared, the *B. aerogenes capsulatus* is present, but in rapidly diminishing numbers, whilst coliform bacilli and pyogenic cocci abound. In the third stage pyogenic cocci remain alone or associated with a 'wisp' or diphtheroid bacillus. In the last two stages films of the pus show large numbers of leucocytes, and a marked feature of this pus is the extreme phagocytosis of the bacteria by the leucocytes (Plate LI, Fig. B).

Dudgeon, Gardner, and Bawtree² have also communicated the results of their bacteriological examinations of wounds. In 100 cases the *B. aerogenes capsulatus* was found in 13, *B. tetani* in 11, *Streptococcus* in 41, *Coliform bacilli* in 26, *Staphylococci* (?), *Diphtheroid bacilli* in 15, *B. proteus* in 7, and *B. pyocyaneus* in 4.

These examinations were made in London, and do not comprise any made on wounds directly after their infliction. The results differ

PLATE LI.
WOUND INFECTIONS

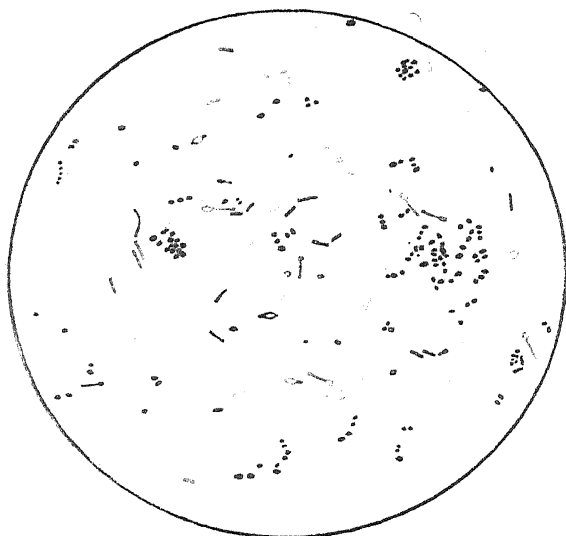


Fig. A.—The appearance of pus in the early stage of infection. The bacterial flora is practically that of feces. Drawn from an actual film. $\frac{1}{12}$ oil-immersion objective, $\times 6$ ocular.

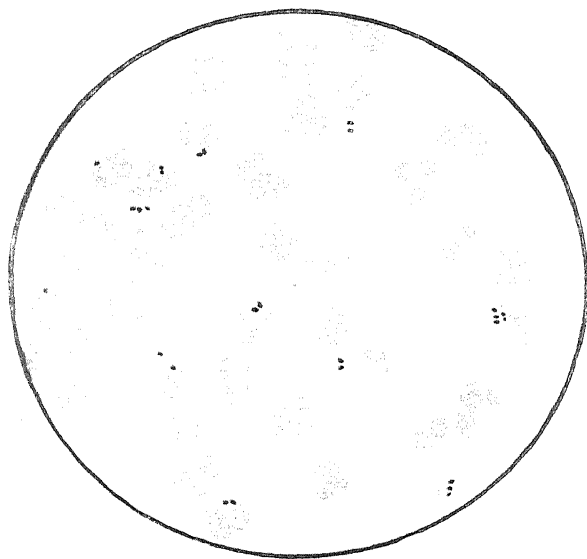


Fig. B.—The appearance of pus in a late stage. Only Gram-positive cocci are present. Notice the well-preserved leucocytes and the phagocytosis. Drawn from an actual film. $\frac{1}{12}$ oil-immersion objective, $\times 6$ ocular.

*Drawn by H. H. Tanner, M.B., R.A.M.C.,
from the Author's specimens*



widely from those of Fleming in one particular. Whereas Fleming recovered streptococci from nearly all wounds in every stage during the three weeks following infliction, Dudgeon and his fellow-workers only recovered them in 41 per cent of cases. It is difficult to see why such a difference should arise. It is possible that a change in the bacterial flora may have occurred during the progress of the war; but the author's experience leads him to agree with Fleming, and to assert that streptococcus is present in the vast majority of wounds, especially in the later stages. The type of streptococcus commonly recovered is in many ways atypical both culturally and morphologically. It grows very freely on agar and in broth, and in size and appearance the colonies resemble those of the *Staphylococcus albus* rather than those usually associated with the *Streptococcus pyogenes*. Chains of more than a few elements are rare, and the cocci present the appearance of somewhat lanceolate diplococci arranged like a saddle-bag. In glucose broth, or more certainly in human serum, growth is extraordinarily rapid and luxuriant, and chains of great length are formed. The author is in entire agreement with the conclusions of Dudgeon, Gardner, and Bawtree, that the sugar tests usually employed to classify streptococci are of no assistance, for a number of strains isolated from wounds and from fæces fail to fall into the groups usually described. The coccus described by the French as enterococcus very nearly corresponds with this streptococcus, and there is little doubt that the fæces must be regarded as its source of origin.

The bacteriology of gas gangrene has been thoroughly investigated. As mentioned above, Weinberg³ isolated the *B. aerogenes capsulatus* from every one of the first twelve cases he examined, and this finding has been confirmed by subsequent workers, as will be seen in the table of results obtained by Fleming,⁴ given on the following page.

The two bacteria referred to in the table as *Bacillus X* and *Bacillus Y* are non-pathogenic spore-bearing anaerobic bacilli, which are largely responsible for the foul smell of gangrenous wounds. Evidence is accumulating to show that the *Bacillus aerogenes capsulatus* possesses relatively feeble virulence for man. It is not until pent-up discharges or imprisoned blood-clot exist under a certain degree of tension that the bacillus multiplies and exerts its harmful influence. Given favourable conditions, however, it can multiply at a quite extraordinary rate. It has been a not uncommon experience of the present war to find well-developed gas formation within a few hours of the infliction of the wound. Fleming has adduced experimental evidence to show that the association of staphylococci, streptococci, and *B. proteus* with the *B. aerogenes capsulatus* increases the activity of the latter. Dudgeon, Gardner, and Bawtree think it certain that some special conditions must be present in order that this bacillus may give rise to gas gangrene, and that in the majority of infected wounds it is either rapidly eliminated, or it settles down to a purely pyogenic or even saprophytic life. Two cases, interesting in this connection, have recently come under the observation of the writer.

CASES OF GAS GANGRENE.

No.	Nature of Injury		<i>B. aerogenes</i> capsulatus	Strepto- coccus	Other Organisms
1	Compound fracture of femur	..	+	+	<i>Staphylococcus albus</i> not seen in pus, but appeared in culture
2	"	humerus	+	+	
3	"	femur	+	+	<i>B. proteus</i> ; <i>B. tetani</i> very numerous
4	"	fibula	+	+	<i>B. Y.</i>
5	"	femur	+	+	
6	"	"	+	+	<i>B. tetani</i> ; <i>B. proteus</i>
7	"	"	+	+	<i>B. X.</i>
8	"	"	+	+	
9	"	humerus	+	+	<i>B. tetani</i> . In superficial blister only <i>B. aerogenes capsulatus</i> and <i>B. tetani</i> found
10	"	femur	+	+	<i>B. tetani</i> ; <i>B. proteus</i>
11	"	humerus	+	+	<i>B. tetani</i>
12	"	femur	+	+	<i>B. X.</i>
13	"	tarsal bones	+	-	<i>B. X.</i> Later developed streptococcal septicæmia
14	"	"	+	+	
15	"	femur	+	+	<i>B. tetani</i>
16	"	"	+	+	<i>B. X.</i> , <i>B. tetani</i> developed in culture
17	"	"	+	+	
18	"	"	+	+	
19	"	"	+	-	
20	"	humerus	+	-	<i>B. tetani</i>
21	"	femur	+	+	<i>B. tetani</i> ; <i>B. X.</i>
22	Wound of thigh	..	+	+	<i>Staphylococcus albus</i> and <i>B. proteus</i> appeared in culture
23	Compound fracture of femur	..	+	+	
24	"	humerus	+	+	<i>B. X.</i>
25	"	femur	+	+	<i>B. Y.</i>
26	Wound of knee-joint	..	+	+	<i>B. X.</i>
27	Compound fracture of humerus	..	+	+	Anaerobic diphtheroid bacillus
28	"	"	+	+	Slender Gram + bacillus which did not appear in culture
29	Wound of thigh	..	+	-	
30	"	"	+	+	
31	Compound fracture of femur	..	+	+	
32	"	"	+	+	<i>B. proteus</i>

Case 1.—(Plate LII, Fig. C.) Sergt. M. was wounded with shrapnel four days before admission to the base hospital. The piece of shrapnel had entered the thigh just above the internal condyle of the femur, had traversed the latter, and finally lodged in the knee-joint. There was swelling around the knee-joint, and out of the entrance wound ran gaseous pus. Microscopical and cultural examinations of this revealed a pure infection by *B. aerogenes*

PLATE LII.

WOUND INFECTIONS—continued

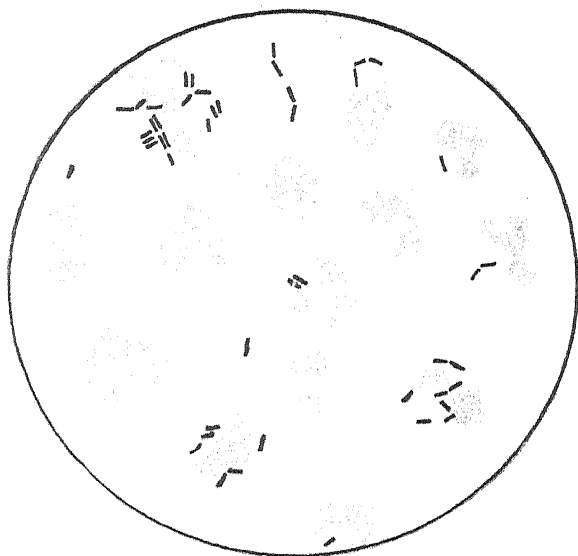


Fig. C.—Drawing of the pus obtained from Case 1. The only bacteria are *B. aerogenes capsulatus*. Notice the healthy leucocytes and the degree of phagocytosis. $\frac{1}{12}$ oil-immersion objective, $\times 12$ compensated ocular.

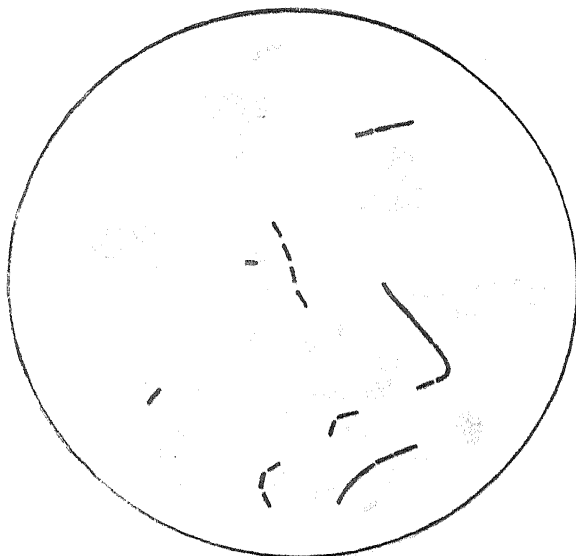


Fig. D.—Drawing of the pus obtained from Case 2. *B. aerogenes capsulatus* and Gram-negative coliform bacilli. Many of the leucocytes have broken down. $\frac{1}{12}$ oil-immersion objective, $\times 12$ compensated ocular.

Drawn by H. H. Tanner, M.B., R.A.M.C.,
from the Author's specimens

capsulatus. The general condition of the patient was good, the temperature was 100° to 100·4°, and the local condition did not give rise to anxiety. A dry dressing of sterile gauze was placed over the wound, whilst the limb remained immobilized in a Thomas's splint. Daily examinations were made of the pus, and always with the same result. The only microbe isolated was the *B. aerogenes capsulatus*. After twelve days the wound was opened up by Captain Fitzmaurice-Kelly, and some pus escaped from a small cavity in the vastus internus muscle. The hole in the internal condyle of the femur was enlarged with a gouge. Cultivations made from its depths yielded no growth of bacteria. The piece of shrapnel was found lying in the knee-joint, and was not removed. The wound was dressed with a sterile dry dressing. At frequent intervals during the subsequent five weeks microscopic and cultural examinations were made of the small quantity of pus which discharged. The only bacterium ever seen or recovered in culture was a *Staphylococcus albus*. The wound healed rapidly, and the patient was sent back to England.

Case 2.—(Plate LII, Fig. D.) Pte. W. was wounded by shrapnel in the back. On admission to the base hospital forty-eight hours later, pus and gas were escaping freely from the wound. In films of the pus, large numbers of *B. aerogene capsulatus* were seen, also a few Gram-negative coli form bacilli. Aerobic culture proved sterile; anaerobic culture yielded a pure growth of *B. aerogenes capsulatus*. The temperature was 100°, general condition good. The wound was dressed with dry sterile gauze. Two days after admission the wound was opened and the piece of shrapnel removed. It was lying just external to the parietal layer of the pleura. The only dressing employed was dry gauze. Three days later the pus was examined and found to be in every way identical with the first specimen examined, with the exception that the bacilli were present in diminished numbers. Four days later no bacteria were to be seen in films, and both aerobic and anaerobic cultures were sterile. The temperature came down to normal within twelve hours of the operation, and remained so. The patient made an uneventful recovery.

Wounds of the chest may show bacteriological flora differing from those of other parts of the body, inasmuch as when the lung tissue is damaged, micro-organisms that are commonly found in the respiratory tract may act as infecting agents. Among those which have been recovered from infections of a hæmothorax are the influenza bacillus and the pneumococcus. Most of the infections, however, are caused by the aerobic and anaerobic bacteria already referred to, and derived from soil or fæces.

The Biology of Infected Wounds.—Seeing that the effective treatment of wounds must depend on our knowledge of the physiological processes which are going on in them, we may proceed to take note of the recent illuminating researches of Sir Almroth Wright.⁵ By means of original and highly ingenious methods, he set himself to study the physiological processes existing in wounds, and he has succeeded in bringing to light many hitherto unknown facts which have a very practical bearing on treatment. He found, in the first place, that on introducing pus into undiluted human serum and incubating the mixture at body temperature, some only of the pyogenic bacteria survive and multiply, whilst the growth of others is inhibited. Pyogenic bacteria can, therefore, be divided into two groups, the serophytes and the serosaprophytes.

The serophytes are those which, presumably because they find their food-stuffs ready made in the blood-fluids, are at home there, and can, in the absence of phagocytes, grow and multiply without, or practically without, restraint. The serosaprophytes are those which cannot grow and multiply in the blood-fluids until a change has passed over those fluids. The action of the blood-serum on the serosaprophytes is so potent that this fluid may, indeed, be termed a strong antiseptic. Convincing proof of this may be obtained by taking an emulsion of human fæces, and making a light implantation of it into fresh human serum. The contaminated serum is placed at body temperature for some hours, and is then examined by the usual methods of cultivation. It will be found that some faecal streptococci and staphylococci have survived, but that the other micro-organisms have been killed off (A. C. I.). So that blood-serum acts as a strong antiseptic against a variety of micro-organisms, many of which are constantly found among the bacterial flora of wounds.

Next, Wright investigated the serum which pours into a wound to see whether this fluid has the same properties as the blood-serum. By means of a very ingenious modification of the cupping-glass, he sucked the lymph from the walls of the wound, and was thus able to compare its properties with those of the lymph lying in the cavity of the wound. The results of these experiments he describes as follows :

“When, after washing out a heavily infected wound with an antiseptic or simple saline solution, we apply a lymph-leech to the walls, and then at the next dressing compare the contents of the lymph leech with the fluid outside, we think at first that there must be some mistake. Outside we have an opaque exudate presenting all the ordinary physical characters of pus containing leucocytes in all the stages of degeneration, and swarming with all manner of pyogenic organisms. Inside we have a transparent and slightly blood-stained exudate containing streptococci in practically pure culture, and in addition a few leucocytes, all of which are actively phagocytic. Except in this latter respect, we have, in fact, identically the same result as when we made our thin implantations of pus into normal serum.”

The next step was to find out wherein this difference lies. It occurred to Wright that this transformation of serum into a fluid which is ideally favourable to the growth of a great number of species of micro-organisms could come only by a digestive process. As was pointed out above, his experiments on the cultivation of pus in serum had suggested that for some bacteria certain essential food-stuffs are missing in the serum, and therefore the growth in serum of these bacteria is inhibited. In pus-lymph, on the other hand, all these microbes grow freely ; Wright set out at once to determine whether this change could not be traced to the action on the albuminous constituents of the serum of digestive ferments. Now serum has a definite antifermentative, or, as is more commonly said, antitryptic power, whilst pus contains a large measure of tryptic ferments which are liberated from disintegrated leucocytes. It was in this reduction

from an antitryptic to a tryptic fluid that Wright saw the reason for the change in the lymph from an unfavourable to a favourable culture medium for bacteria. Crucial experiments, in which he added progressive amounts of trypsin to serum before the implantation of serosaprophytic microbes, strikingly confirmed his hypothesis. As he tersely puts it, "the outcome of these experiments can be summed up in a sentence. When we add trypsin in quantities sufficient to reduce appreciably the antitryptic power, but insufficient to give us any free trypsin, the serum is converted into an eminently favourable nutrient medium for serosaprophytic microbes." As is well known, the body is endowed with wonderful powers to react against harmful influences, and just as the body reacts against bacteria by the elaboration of antibacterial protective substances, so it reacts against this ferment action by increasing the antitryptic power of the blood.

Investigations by Tanner have shown that the antitryptic power of the blood is quite regularly raised during the course of septic infection of wounds. Further, a recent experiment of Wright's has established the fact that this defensive mechanism comes into play very soon after the infliction of the wound. Bloods were collected at a field ambulance dressing-station, from men who had been wounded twenty to fifty hours previously, and in every case their antitryptic power was found to be markedly raised. Another property of this tryptic pus is to render the blood with which it comes in contact very rapidly coagulable (A. C. I.), a point of practical importance when we come to consider the treatment of wounds.

Those who have followed the large amount of work which has been published during the last decade on the processes involved in immunization against bacterial infection, are aware of the highly important part played by the white blood-corpuscles in this connection. In response to bacterial infections the body elaborates substances which can kill and dissolve microbes, and others which render them more acceptable to the phagocytic leucocytes. The evidence at hand assigns a quite exceptional rôle to the leucocytes during the infection of wounds by the pyogenic bacteria. White corpuscles gathered from the walls and cavities of infected wounds are constantly found to be full of microbes, whilst the opsonizing power of the serum towards certain bacteria is as constantly found to be raised. The highly important part played by the leucocytes led Wright to study the factors which determine their emigration into wounds. Having again devised a quite original technique, he found that the movements of leucocytes may be of two kinds. The leucocytes may wander at large, or they may move in a particular direction under the influence of a chemical stimulus. Various chemicals have been found to exert different effects on the process of emigration, as will be seen later when we come to discuss the action of antiseptic solutions. At this point we may mention as an example the action of sodium chloride, for it will be seen to be of importance when we deal with the treatment of wounds. Sodium chloride in normal isotonic solution (0.85

per cent) calls forth a vigorous emigration of leucocytes, whilst in hypertonic solution (5 to 10 per cent) it suppresses emigration entirely.

The presence of microbes stimulates emigration, and it is especially the polymorphonuclear leucocytes which wander out and attack the bacteria. These studies are as yet in their infancy, but they have placed a very valuable method in our hands. They have taught us how to activate or restrain the emigration of leucocytes into the wound, and further, they enable us to study the activating or restraining influence of any solution we may propose to put into the cavity.

Finally, brief reference must be made to some experiments dealing with the action of hypertonic salt solution when introduced into wounds. Such a solution in a concentration of 5 to 10 per cent has been shown to cause a copious discharge of serum from the walls of the wound. This serum retains the antibacterial and the antitryptic properties of blood-serum, and is almost free from admixture of cells. Secondly, hypertonic salt very markedly retards the coagulation of blood. Lastly, it inhibits the growth of bacteria. On the foundations of the above researches, Wright has built up a method of treating infected wounds, and he calls it the treatment by physiological methods.

Treatment of Infected Wounds.—The general discussion of the proper treatment of infected wounds may be resolved into the following formula :—

Free drainage	{	(a) Combined with treatment by antiseptics.
		(b) Combined with treatment by physiological methods.

There is no discussion as to the necessity for efficient drainage. As we have seen, microbes have been carried deep into the tissues and multiplied there, and if there is not a sufficient exit to the wound, a degree of tension is very soon established under anaerobic conditions, and may gravely endanger the life of the patient. The methods and principles of drainage will be considered later; at present we are only dealing with general considerations. The discussion centres round the respective value of treatment by antiseptics and treatment by physiological methods. We will consider the two methods separately.

Treatment by Antiseptics.—Antiseptics are solutions of chemicals which in certain concentrations exert a destructive influence on all living matter. They can destroy microbes, but they can also destroy living cells, and it is a golden rule that they will always be able to destroy the latter more easily than the former. We know of only three chemical substances which have a greater affinity for infecting agents than for tissue cells. These are salvarsan in syphilis and anthrax, optochin hydrochloride in pneumococcal infections (at all events in animal experiments), and quinine in malaria. All other antiseptics have a greater affinity for the living cell than they have for microbes. Another disadvantage of antiseptics is that their action is quenched by blood, and still further by pus. Dakin and

Daufresne,⁶ have recently studied this matter, and tabulate their results thus :—

Antiseptic	Without Blood Serum	With Blood Serum
Phenol	1-250 — 1-500 +	1-50 — 1-100 +
Salicylic acid	1-2500 — 1-5000 +	1-100 — 1-250 +
Hydrogen peroxide	1-3500 — 1-8000 +	1-1700 — 1-2000 +
Iodine	1-100,000 — 1-1,000,000 +	1-1000 — 1-2500 +
Mercuric chloride	1-5,000,000 — 1-10,000,000 +	1-25,000 — 1-50,000 +
Silver nitrate	1-1,000,000 — 1-10,000,000 +	1-10,000 — 1-25,000 +
Sodium hypochlorite	1-500,000 — 1-1,000,000 +	1-1500 — 1-2000 +
Benzene sodium sulphochloramide	1-500,000 — 1-1,000,000 +	1-1000 — 1-2000 +
Paratoluene sodium sulphochloramide	1-750,000 — 1-1,500,000 +	1-2000 — 1-3000 +
Acetylchloraminodichlorbenzene	1-500,000 — 1-1,000,000 +	1-2500 — 1-5000 +

The figures indicate the concentration of antiseptic necessary to sterilize one drop of a fresh culture of *Staphylococcus aureus* in a total volume of 5 c.c. acting for two hours. + indicates growth; — indicates complete sterilization.

Fildes, Rajchman, and Cheattle⁷ have investigated the relative bactericidal power of antiseptics in the presence of serum, serum and corpuscles, and pus, with the following results :—

THE AVERAGE ANTISEPTIC ACTION OBTAINED AFTER INCUBATION FOR
24 HOURS AT 37°C. WHEN USING STAPHYLOCOCCUS AUREUS AS A
TEST OBJECT.

<i>Carbolic Acid</i> —			
Tested in serum	killed in a dilution	.. .. .	1-120
" "	" + corpuscles killed in a dilution	.. .. .	1-120
" "	pus	" "	1-120
<i>Biniodide of Mercury</i> —			
Tested in serum	" "	.. .. .	1-15,000
" "	" + corpuscles	" "	1-5000
" "	pus	" "	1-800
<i>Corrosive Sublimate</i> —			
Tested in serum	" "	.. .. .	1-15,000
" "	" + corpuscles	" "	1-5000
" "	pus	" "	1-1200
<i>Iodine</i> —			
In alcoholic solution	tested in serum	.. .. .	1-300
In watery	" "	.. .. .	1-300
In alcoholic	" " + corpuscles	.. .. .	1-300
In watery	" "	.. .. .	1-300
In alcoholic	" pus	.. .. .	1-240

Parry Morgan⁸ has compiled the following tables from his records of experiments. It must be realized that he was dealing with the action of antiseptics on pus recovered from wounds, and in the nature of things the results varied with different samples of pus. Further, in the bactericidal experiments, it is not to be understood that no destruction of microbes occurred in the dilution of antiseptic mentioned. There was killing of many microbes, but the pus was not sterilized.

INHIBITORY ACTION OF ANTISEPTICS ON THE GROWTH OF
ORGANISMS IN PUS AND IN BLOOD. INCUBATED AEROBICALLY.
FOUR PARTS PUS, ONE PART ANTISEPTIC.

Antiseptic	Blood	Pus
Lysol	1-500*	1-160*
Carbolic acid	1-400*	1-480*
Hydrogen peroxide	—	1-5*
Tincture of Iodine	—	1-2000*
Biniodide of mercury	1-2000*	1-1000*
Eusol	1-400*	—
Dakin's solution	1-400*	—

* Growth occurred in the presence of this dilution of the antiseptic.

BACTERICIDAL ACTION OF ANTISEPTICS ON ORGANISMS IN PUS. INCUBATED
AEROBICALLY. PUS ONE PART, ANTISEPTIC NINE PARTS.

Antiseptic	Growth in Dilution
Carbolic acid ..	1-40.
Hydrogen peroxide ..	Undiluted.
Tincture of iodine ..	1-500.
Biniodide of mercury ..	1-400 to 1-800.
Eusol ..	Diluted 8 times (hypochlorous acid 1-1600.)
Dakin's solution ..	
Carbolic acid diluted in H_2O_2	No growth 1-40.
Biniodide of mercury diluted in H_2O_2 ..	
	No growth 1-400.

The above investigations indicate that when an antiseptic is introduced into a wound, and comes in contact with blood or pus, it is rapidly rendered inert as a bactericidal agent.

An important investigation has recently been undertaken by W. D'Este Emery,⁹ on the action of antiseptics with special reference to their effect on the cellular and humoral defences of the body. The conclusions he has arrived at are expressed as follows: "It cannot be too strongly emphasized that all antiseptics, without exception, are capable, when improperly used, of doing a very considerable

amount of harm. It is realized in a vague sort of way that when used in too great a concentration they are 'irritating,' but the meaning of this term and its bearing on the healing of wounds is not properly understood. The harmful effects of antiseptics are in the main due to the action of the substances in question on the protective cells (in the main, the leucocytes) and substances in solution in the blood to which the natural defences of the body are entrusted. Now it has been found, with practically no exception, that these harmful effects are manifested in dilutions of the antiseptic much greater than those which kill the organisms; in other words, dilutions of an antiseptic which are powerless to kill organisms in the blood or tissues, may nevertheless be quite potent enough to kill the tissues and annul the natural defences of the blood, thus allowing the microbes to flourish unchecked. For example, Eusol will not sterilize blood infected with a common streptococcus of wounds when mixed therewith (undiluted) in equal quantities; but it will paralyze the leucocytes at a dilution of about 1-30, and destroy complement (one of the chief bactericidal elements in blood) in about the same strength. Carbolic acid will only sterilize blood infected in this way slowly in a strength of 1-60, and is powerless when slightly more dilute; but it paralyzes leucocytes at a dilution of 1-800, and sometimes even when very much weaker than this, and is about equally efficacious against complement. Now the first and most striking lesson to be learnt in connection with the physiology of wounds is this: that given favourable conditions, the natural defences of the body are quite sufficient to deal with the organisms of the type met with in wounds as seen in France in this war. Wounds that are effectively drained and freed from all foreign bodies, universally tend to recovery, and do not lead to septicæmia or gangrene. The question which the practitioner who has to deal with a wound must put to himself is this therefore: 'Can I hope by means of antiseptics to kill *all* the microbes in this wound?' If he can answer this in the affirmative, well and good. If not, he may rest assured that the use of any antiseptic, without exception, will be injurious to the patient by destroying the potent and entirely efficient protection which nature has provided, and which, if given fair play, would render the use of an antiseptic entirely unnecessary. Small superficial wounds that would heal under any or no method of treatment may perhaps be effectively sterilized by antiseptics without very extensive injuries to the tissues, but that any deep and lacerated wound, such as are unfortunately the rule rather than the exception, can be rendered completely sterile by any practicable procedure in this way, I believe to be entirely impossible.

"In this connection the question of the penetrative power of the antiseptic is also of extreme importance; and this must be determined under conditions which reproduce, as nearly as possible, those which occur in the body. This cannot be done with exactness. In the walls of a wound there is still some circulation of blood and lymph which will carry away any antiseptic which may be put into the

wound, and effectively prevent its access to the deeper layer of the tissues, which are nevertheless infected with bacteria. When the antiseptics are tested in dead and inert blood-clots, we find that their powers of penetration are extraordinarily limited. We find, for instance, that undiluted Eusol penetrates about a millimetre; that is to say, organisms further than this from the surface have time to develop into colonies long before they are killed, when this substance soaks in from outside. Under the actual conditions which are met with in practice, no such favourable action is to be expected. What is to be expected, and what a little study of wounds treated with antiseptics shows actually occurs, is something as follows: There is a killing of the organisms in the superficial parts of the wound, so that the pus may be examined, no growth obtained, and the surgeon has a pleasing belief that the wound is completely sterilized. In the deeper layers of the wound the growth of the organism proceeds unchecked, or even stimulated by the destruction of the defensive mechanisms of the blood and leucocytes. For a time all seems well, but afterwards there is either a sudden burst of pus, rich in bacteria (especially perhaps the anaerobic forms), or the development of a septicæmia. If the antiseptic is applied by the method of continuous irrigation, this may not occur, as the pus may be washed away and much of the effect of efficient drainage obtained—results that can be obtained more certainly and with less danger of harm by safer and more physiological methods."

Let us now consider what the position of antiseptics was before the war, and what was expected of antiseptics in the treatment of wounds received in action. It was generally admitted that wherever aseptic conditions, such as obtain in the operating theatres of our modern hospitals, with their highly trained personnel and modern equipment, could not be realized, antiseptic solutions were necessary for the sterilization of surgical instruments, the surgeon's hands, and the patient's skin. Reliance is placed on antiseptics for this purpose in the every-day practice of major and minor surgery and midwifery under the most varying circumstances. In the treatment of dirty wounds in civilian practice, reliance is placed on antiseptics to prevent the introduction of fresh microbes into the wound and to disinfect the surfaces of the wound which have become contaminated. So long as the infection has been a superficial one, these measures have been attended with success; but it will not be disputed that in the case of lacerated wounds where the infection has been carried deep into the tissues, sepsis has been the rule rather than the exception, in spite of the most rigorous application of antiseptics.

It was hoped that the early introduction of suitable antiseptics into wounds received in action under the conditions of modern warfare would help to prevent or to diminish the incidence of septic infection. At the very outbreak of the war it was found that this desideratum was not to be realized. In spite of the early application of the antiseptic served out to the troops as a first dressing, all wounds

PLATE LIII.

WOUND INFECTIONS—continued

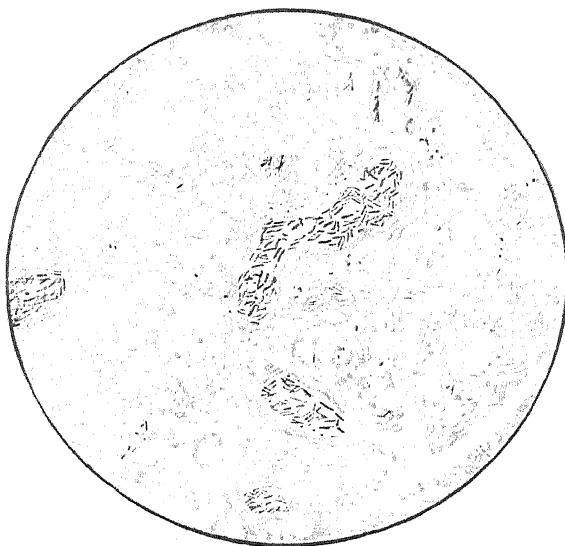


Fig. E.—A section of the wall of a shrapnel wound of the thigh. The man was also shot in the head, and died thirty hours after being wounded. The tissue was removed post mortem. Notice the number of bacilli which have already grown out. The area chosen for reproduction was at least 2 cm. deep to the surface of the wound. $\frac{1}{2}$ objective, $\times 6$ ocular.

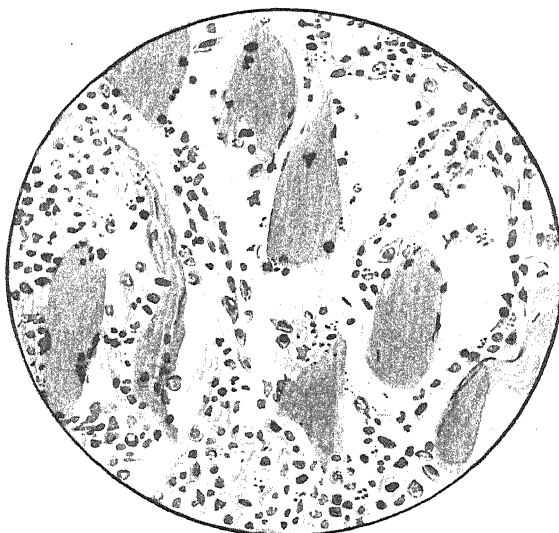


Fig. F.—Another section obtained from the same case. Notice the separation of the muscle fibres and the inflammatory reaction. $\frac{1}{2}$ objective, $\times 8$ ocular.

*Drawn by H. H. Tanner, M.B., R.A.M.C.,
from the Author's specimens*

suppurated freely. The reason for this soon became apparent. The missiles had carried infecting microbes deep into the tissues beyond the reach of antiseptics. *Plate LIII, Figs. E, F*, illustrate this point. The sections were made from the wall of a shrapnel wound of the thigh thirty hours after infliction. As soon as this was realized, an investigation was started with a view to discovering an antiseptic which could penetrate into the tissues without losing its antibacterial properties. Sir William Watson Cheyne, Fleet-Surgeon Bassett-Smith, and Mr. Edmunds,¹⁰ were appointed by the Director-General of the Medical Department of the Navy to inquire into the matter. The problem they set themselves was to find a substance "which would diffuse in the blood in a wound and the tissues which form its wall, and inhibit the growth of the bacteria in the area through which it diffused, till such time as the wound can be thoroughly disinfected." As the result of an elaborate series of experiments, these investigators recommended the use of two preparations as a first dressing. They proposed "that **Borsal** (salicylic acid and boric acid in equal parts) should be used as a powder and thickly dusted over the wounds as far as possible, and that its action should be reinforced by the injection of cresol paste (20 per cent in lanolin and wax base) into the interior of the wound in various directions." Unfortunately, the good results which were hoped for from this combination of antiseptics has not been realized in practice. After a trial on cases wounded on the western front, the consulting surgeons to the Expeditionary Force were unable to recommend its adoption as a satisfactory prophylactic against septic infection. This also holds good for all the other antiseptics which have been tested.

When once the bacteria have multiplied in the wound, antiseptics can only play a very subordinate part in the treatment of the infection. To begin with, as we have just seen, these chemicals cannot penetrate far enough into the tissues to get at the bacteria at the site where they are multiplying. Secondly, as we saw above, antiseptics are rapidly rendered inert by blood, serum, and pus. And lastly, in effective concentrations they only make matters worse by damaging the tissue cells and destroying the natural defences of the body. Watson Cheyne,¹¹ in a recent communication, goes so far as to say that he dislikes "to see septic wounds washed out with antiseptics. That procedure cannot possibly disinfect the wound nor in any way diminish the sepsis even temporarily, except by mechanical removal of the pus, which can be done much more safely by the use of isotonic solutions; and not only so, but the antiseptic may seriously interfere with the antibacterial action of the tissues, especially if it is at all a strong solution used under the idea that it will act as a bactericide." Few medical men who have had the opportunity of studying large numbers of septic wounds would not whole-heartedly endorse this opinion.

In the late stages of wound infections, when a condition of chronic localized sepsis has supervened, the data on which we can base our

opinion of the value of treatment by antiseptics are incomplete. For this reason brief reference may be made to three new antiseptics which have been well spoken of, and which may find application as accessories to other methods of treatment. Fildes, Rajchman, and Cheattle¹² recommend the following solutions, and give directions for their use:—

“Perchloride of mercury (cryst.), 1.0 gram; 80 per cent spirit (industrial), 100 c.c. Malachite green (pure), 1.0 gram; 80 per cent spirit (industrial), 100 c.c. The two solutions are kept separate in bulk, and mixed for use in equal parts. It is found that if the two parts are mixed together and kept for several days, a compound of mercury and malachite green crystallizes out of solution.

“The malachite green must be ‘pure,’ since most of the samples upon the market contain over 50 per cent of adulterants. So far as we are aware, the proper salt is to be obtained only from Messrs. Baird and Tatlock, Ltd., 14, Cross Street, Hatton Garden, London, E.C. Even ‘pure’ samples contain a certain quantity of impurities which are insoluble in alcohol, and therefore the stock solution of malachite green must be filtered.

“The ‘strong’ mixture which we have been using tentatively contains the same ingredients, but in double quantity.

“These solutions are to be applied in a spray, and it must be emphasized that the treatment must be thorough, comprising the whole wound and a wide area of the surrounding skin. A superficial sprinkling over a wound is of no value. There is a tendency to apply the mixture insufficiently owing to the smarting which results from the spirit basis, in the same way as with iodine. This smarting, however, occurs only during the first three or four days of the treatment of a fresh wound, and though sometimes unpleasant, does not persist for longer than one and a half minutes. If the mixture is applied with a good spray held as far as possible from the wound, and if the wound is vigorously fanned, this disadvantage may be reduced to a minimum. After the first three or four days the application is painless. Care must be taken that the spirit has entirely evaporated from the skin before the dressings are applied, otherwise blisters may result. This is particularly important when fomentations are superimposed upon the mixture; in fact, the stronger formula should not be used together with fomentations.

“The question of a good spray is complicated by the present difficulties in glass manufacture. Vulcanite sprays are not satisfactory; they rapidly become stopped up and rendered useless. The best spray is made of glass, and after that design in which the fluid is carried up a central capillary tube to the orifice without recesses in which solid matter can become lodged. The central capillary should not be fine, since a coarse spray is much less liable to occlusion.

“We have not succeeded in finding an entirely satisfactory spray upon the market. In most cases the nozzle points upwards instead of downwards, while the containers are much too small. We have

therefore designed a spray which has been carried out by Mr. Frank A. Rogers, 327, Oxford St., W., and sold under the name 'Rogers's Surgical Spray.' This will be found to be quite satisfactory in use. Whatever instrument is adopted, it will give better service if the point of the nozzle is wiped dry after use and the central capillary is occasionally cleaned out with a wire."

Dakin¹³ suggests the use of a solution of sodium hypochlorite, and gives the following directions for its preparation :—

The preparation of a solution of suitable concentration for direct application, containing 0.5 to 0.6 per cent of sodium hypochlorite, may be carried out very simply as follows : 140 grams of dry sodium carbonate (Na_2CO_3), or 400 grams of the crystallized salt (washing soda) are dissolved in 10 litres of tap-water, and 200 grams of chloride of lime (chlorinated lime) of good quality are added. The mixture is well shaken and, after half an hour, the clear liquid is siphoned off from the precipitate of calcium carbonate and filtered through a plug of cotton ; 40 grams of boric acid are added to the clear filtrate, and the resulting solution is ready for use. A slight additional precipitate of calcium salts may slowly occur, but it is of no significance. The solution should not be kept longer than one week. The boric acid must not be added to the mixture until after the filtering,

Lorrain Smith, Drennan, Rettie, and Campbell¹⁴ have also directed their attention to the hypochlorites, and as the result of their experiments recommend the use of two preparations : (1) Eupad, a powder, consisting of equal weights of finely ground bleaching powder and powdered boric acid intimately mixed ; (2) Eusol, a solution of free hypochlorous acid, which may be prepared by two methods :—

a. Twenty-five grams of eupad are shaken up with 1 litre of water, allowed to stand for a few hours, then filtered through cloth or filter-paper.

b. To 1 litre of water add 12.5 grams bleaching powder, shake vigorously, then add 12.5 grams boric acid powder and shake again. Allow to stand for some hours, preferably overnight, then filter off, and the clear solution is ready for use.

This solution contains hypochlorous acid 0.54 per cent, calcium biborate 1.28 per cent, calcium chloride 0.17 per cent ; total 1.99.

In conclusion, it may be said that we are forced to the opinion that antiseptics can only play a subordinate part in the treatment of wounds. On the other hand, their rôle as sterilizing agents for instruments, etc., for the prevention of wound-to-wound infection, is of paramount importance under war conditions. Aseptic surgery is here out of the question. Our advice should be : "Do not hesitate to use antiseptics in the environment of the wound ; avoid their use in the wound itself."

Treatment by Physiological Methods.—This is a method which has been advocated by Sir A. Wright as a result of the researches carried out by himself and his fellow-workers, both at the bedside and in the

laboratory. Let us recapitulate the essential practical findings of these workers.

1. The blood-serum is strongly bactericidal for all the microbes found in wounds, with the exception of two, the streptococcus and the staphylococcus.

2. Blood-serum and leucocytes actively destroy the streptococcus and the staphylococcus. A considerable degree of immunity is developed against the latter coccus, very little against the former. Fortunately, the streptococcus usually found in wounds is of comparatively low virulence.

3. Pus renders blood more readily coagulable. There is, therefore, a tendency to the development of a layer of clotted lymph on the surface of the wound which will militate against successful drainage. This property of pus can be brought to nought by the action of sodium citrate.

4. Pus is tryptic, and by a process of digestion converts the anti-bacterial blood-serum into a medium suitable to the development of microbes. Normally the blood is antitryptic. It becomes still more so during infection by the pyogenic bacteria as the result of immunizing response on the part of the body. Further, this response can be artificially induced by the injection of an appropriate dose of any vaccine.

Wright proposes the following scheme : To dissolve any coagulated lymph from the wall of the wound by means of sodium citrate, and to cause blood-serum to flow into the wound in a continuously renewed stream. This is accomplished by irrigation of the wound with a liquid which is hypertonic to the blood. In practice, a solution of sodium chloride in a concentration of 5 to 10 per cent has shown itself to satisfy the requirements. A 12 per cent dextrose solution is equally efficacious. It will be recognized that this stage of the treatment is directed against the serosaprophytic bacteria which cannot multiply in fresh serum. It corrects the tryptic action of pus by bringing into the wound relays of antitryptic serum to neutralize the trypsin. It prevents the coagulation of blood and lymph, and so makes for better drainage. Lastly, by itself the hypertonic salt inhibits microbic growth.

Seeing it is on the blood that reliance is placed, local treatment may be supported by certain general considerations. Of high importance is the complete immobilization of the affected part of the body and the least possible disturbance of the affected tissues to minimize the risk of dissemination of bacteria or their products. Further, attention to the general condition of the patient, regulation of the bowels, an adequate and suitable diet, and a liberal supply of fresh air, will place him under conditions suitable for the full development of his immunizing response.

If satisfactory 'lymph lavage' has been established by the irrigation of the wound with the above solution, it will be found that the appearance of the wound and the character of the discharges rapidly

alter. The pus is no longer putrefactive in character, the microbic flora has changed from that of faeces to a nearly pure growth of streptococci and staphylococci, and the appearance of the tissues reminds one of the raw red meat one sees in butchers' shops. When this stage has been reached, our efforts must be directed against the pyogenic cocci. In addition to serum, leucocytes must be brought into action. This is achieved by substituting for the hypertonic an isotonic solution of sodium chloride. The effects of this change are quickly recognizable to the naked eye. In place of the raw red appearance of the tissues, a grey film spreads over them, due, as microscopic examination affirms, to the advent of large numbers of polymorphonuclear leucocytes. These white cells, with the help of the serum, attack the microbes, and are seen to be actively phagocytic. At this stage the system of drainage must be regulated as perfectly as possible, for in the fight between the leucocytes and microbes many of the former are killed, and so liberate their tryptic ferment. Retention of such cells will corrupt the blood-serum, and any serosaprophyte lurking in the depths of the wound will quickly take advantage of this fact and multiply. It is well to keep careful watch over the microbic flora to make certain that there is no progressive corruption of the lymph, and should such occur, it is well to revert temporarily to the hypertonic solution. If, on the other hand, the leucocytes and serum gain an ascendancy over the pyogenic cocci, we gradually find, on microscopic examination of the discharges, a diminution proceeding to almost complete disappearance of cocci, few or no degenerate leucocytes; but a host of well-formed, active, living cells. When this result has been achieved, Wright suggests that the surgeon should consider the possibility and advantages of partial closure of the wound. If circumstances permit of the reduction of the surface area of the wound by secondary suture, it will clearly be to the immediate advantage of the patient, and the risk of infection from without will be diminished. A number of cases have now been treated along these lines at the base hospitals in France, with very encouraging results. The writer has recently had the opportunity of visiting many of these institutions in the various centres, and has found a consensus of opinion very favourable to this method of treatment.

We may consider the treatment of wounds during the following arbitrary stages: (1) *The incubation period*; (2) *The stage of pent-up discharge*; (3) *The stage of flowing discharges*; (4) *The stage of chronic localized sepsis*.

1. THE INCUBATION PERIOD.—This comprises the period immediately following the infliction of the wound, up to the time when the microbes introduced by the missile have multiplied in the damaged tissue, and have called forth the defensive response on the part of the body. At this stage the medical officer must keep uppermost in his mind the knowledge that bacteria have been introduced deep into the tissues, will certainly multiply there, and will constitute a grave menace to the patient's life if they gain the upper hand of his resistance. The

indications for treatment are clear. The wound must be laid open, and the affected part of the body must, if possible, be immobilized. The former procedure gets rid of the existing anaerobic conditions, allows for the evacuation of infected clothing, blood-clot, etc., and the control of excessive bleeding, whilst the latter minimizes the risk of dissemination of bacteria and their products. In selected cases, where it is probable that the bacteria have not been carried deep, where there is no marked pocketing in the wound, and no large vessels or nerves or bones which it is inadvisable or impossible to remove are exposed, excision of the wound and primary suture has been advocated by H. M. W. Gray.¹⁵ The advantages claimed for its use are : (i) Healing by first intention is assured in the vast majority of properly selected cases ; (ii) Much time is thereby saved. Some wounds, which would otherwise require months to heal, are soundly united in the course of ten to fourteen days. The soldier is thus available for duty again at a much earlier date ; (iii) The amount of attention required to be given by the medical officers and nursing sisters, etc., is greatly reduced ; (iv) Much pain is avoided ; (v) The amount of dressings required is reduced to a minimum, and in this way expense is lessened ; (vi) Complications which may arise from the presence of a septic wound are avoided ; (vii) A more slightly scar is obtained ; (viii) Because of the absence of contraction which would accompany formation of a large cicatrix, there is less impairment of function in the part concerned ; (ix) In the case of head injuries, excision of the wound, especially in some apparently trivial injuries, provides a means of ascertaining, with greater certainty than by any other method, whether depressed fracture or injury to the brain co-exists.

It must be fully realized that the presence of pockets or of zones of inflammation in the wall of the wound are absolute contra-indications of this method of treatment.

During this stage, too, every wounded man must receive a prophylactic dose of antitetanus serum. It is gratifying to learn that the compulsory use of this serum in all cases has led to a marked diminution in the incidence of this very fatal infection. The following notes are abstracted from the memorandum on the treatment of injuries in war, issued by the War Office :—

“ Since in the first two months of the war more cases of tetanus occurred than had been anticipated, either by ourselves or our Allies, it was decided to direct that a preventive dose of serum should be given to every wounded man, in place of leaving this, as had been done at first, to the discretion of the medical officer. The results have been excellent, and, in the last six months, there have only been thirty-six cases of the disease among those who received a preventive dose of serum within twenty-four hours of being wounded. That this is not due to the possible absence of the cause of infection from the soil is clear from the following facts : (i) Bacteriological examination of the wounds has often proved the presence of tetanus bacilli, although no tetanic symptoms have followed ; (ii) Many in

stances of slight trismus, or of localized tetanic spasms of a muscle or a group of muscles, have been reported, without the subsequent development of generalized tetanus; (iii) Thirty-four cases of severe tetanus have been reported in this period among the very small fraction of wounded men who, for one reason or another, had not received a preventive dose of the serum within twenty-four hours; (iv) A considerable number of wounded horses continue to develop the disease.

"The general use of preventive inoculation of the serum has also had an effect on the severity of the symptoms, if, in spite of the preventive dose, the disease should subsequently develop. For example, of the 34 cases mentioned above, which did not have a preventive dose within twenty-four hours, 32 died, a case-mortality of 94.1 per cent; whereas, of the 36 cases which occurred among the enormously larger class of wounded who *had* received a preventive dose, 28 died, a case-mortality of 77.7 per cent.

"The preventive dose of 500 units should be given at the earliest possible moment, and the fact of inoculation, as well as the size of the dose, should invariably be recorded on the 'tally.' In severe wounds, medical officers not infrequently give 1500 units; there is no objection to this, but, at the same time, there is no evidence that the smaller dose is insufficient, if given promptly.

"It should be remembered that injuries other than those caused by bullets or shells may also become infected; several fatal cases have followed trivial injuries for which the soldier did not report sick at the time, and others have followed on the gangrene due to frostbite. It would be wise to give a preventive dose in all instances in which the danger of infection of a wound with contaminated soil may be presumed to exist.

"Several different preparations of tetanus antitoxin are in use. These have all been recently tested, and in each case they were found to contain at least the number of units claimed."

It cannot be too strongly insisted upon that the above methods of treatment must be instituted at the earliest possible moment. Unfortunately the incubation period is sometimes of all too short duration. Granted suitable conditions, the anaerobic bacteria multiply at a quite extraordinary rate in the tissues, and it is not uncommon to find well-developed gas gangrene within a few hours of the infliction of the wound.

2. THE STAGE OF PENT-UP DISCHARGES.—A moment's thought will indicate the appropriate treatment at this stage. Free vent must be given to the discharges. Efficient drainage must be established by surgical measures, with due regard to the damage of important structures, and the minimal disturbance of the focus of infection. If gas gangrene has supervened, the whole wound and all neighbouring tissues which are gaseous must be freely opened up, dead tissue removed, and the exposed surfaces thoroughly washed over with hydrogen peroxide. Several surgeons, following the initiative of Bayeux, claim good results from the subcutaneous injection of large quantities of

oxygen (several litres) around the infected area. If the gangrene has developed to such a degree as to cause the death of a limb, amputation by the transverse flapless method (Fitzmaurice - Kelly) should be immediately practised if the general condition of the patient offers a reasonable prospect of recovery.

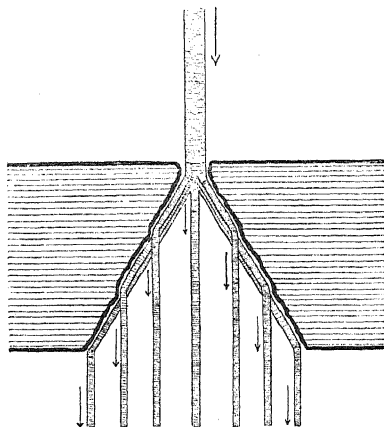


Fig. 55.—Diagram showing the inverted funnel wound. Introduction of irrigating fluid along single width of bandage. Outflow by many.

wound, and the cavity should be lightly packed with soaks of hypertonic salt solution. As soon as more detailed treatment can be arranged for, there is little doubt that the most successful treatment consists in the thorough irrigation of the wound. For reasons discussed above, the irrigating fluid should be salt solution in different concentrations according to the state of the wound. Wright and Tanner¹⁶ have recently thoroughly investigated the question of the irrigation of wounds, and have devised a practical and useful method for its application.

For the purpose of description of the method, we may remind the reader that the wounds resulting from the missiles used in the present war assume certain characteristic forms. For purposes of irrigation they may be classified according to their shape and lie when the patient is recumbent :—

(A). *Perforating, with Entrance and Exit Wound.* (a) Exit wound

3. THE STAGE OF FLOWING DISCHARGES.—

This stage may be said to begin the moment the surgeon has opened up the wound and allowed the discharges to escape. As this measure should be undertaken at the earliest possible moment, a temporary drainage system should be arranged for, pending the arrival at a base hospital. Wide drainage tubes, with lateral holes, should be introduced into the depths of the

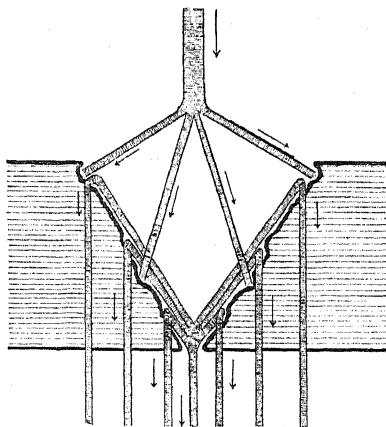


Fig. 56.—The upright funnel wound. The irrigating fluid is led in by many widths of bandage. The outflow is arranged for by many widths draining from the depth of the wound, and passing out of the exit wound.

larger than entrance wound : (i) Upright funnel, e.g. entrance back of thigh, exit in front ; (ii) Inverted funnel, e.g. entrance front of thigh, exit behind ; (iii) Lateral funnel, e.g. entrance outer, exit inner aspect of thigh. (b) Exit wound same size as entrance wound. Tubular wounds.

(B). *Non-perforating Cul-de-Sac, with Entrance Wound only.* (a) Ascending, e.g. entrance opposite insertion of deltoid muscle, projectile in shoulder-joint. (b) Descending, e.g. entrance by anterior superior iliac spine, projectile in gluteus maximus muscle.

(A) *Perforating Wounds.*—In irrigation we have to lead in the irrigating fluid, bring it into contact with the surfaces of the wound, and lead it out and away freighted with discharges. The fluid is

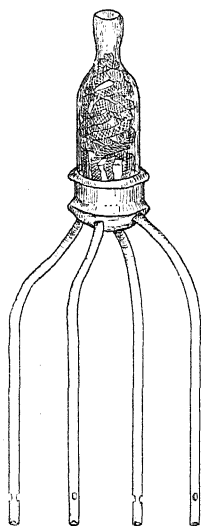


Fig. 57.—The rose-irrigator.

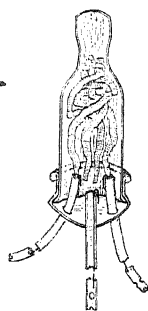


Fig. 58.—Section of the rose-irrigator, showing its component parts. The glass portion can be made from the upper third of a test-tube. The rubber cap is the usual rubber test-tube cap employed in bacteriological laboratories.

always introduced into the wound from above ; how, is determined by circumstances. If the entrance wound is uppermost (inverted funnel), the fluid is introduced along a single width of surgical bandage

(see Fig. 55). If the exit wound is uppermost (upright funnel), the fluid is introduced along many widths of bandage (see Fig. 56). The fluid is brought in contact with the surfaces of the wound by arranging a number of widths of bandage, connected with the parent stream so that they cover and bathe the exposed tissues, or by directing the stream on to the walls of the wound by means of a 'rose-irrigator.' This ingenious apparatus, devised by Tanner, will be best understood by reference to Figs. 57 and 58. It consists of a leath of gauze strips enclosed in a glass chamber, the lower end of which is closed by a rubber cap, whilst its upper end is drawn out to connect with the rubber delivery-tube of an irrigation-can. The ends of the gauze strips are inserted into the upper openings of four or five small rubber drainage tubes, which pass through holes in the rubber cap and are

stiffened by stylets of soft copper wire. These stiffened tubes can be inserted into the wound, and direct the stream of liquid on to any desired spot or into any otherwise inaccessible pockets. The fluid is

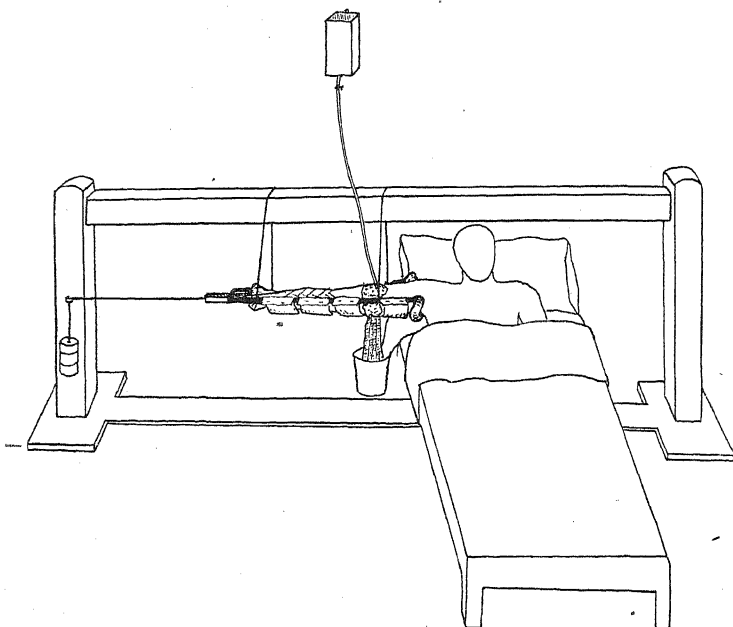


Fig. 59.—Immobilization of limb by Balkan method with extension. Irrigation system at work.

always led out of the wound from the exit wound. If the exit wound faces downward (inverted funnel), a number of widths of bandage are

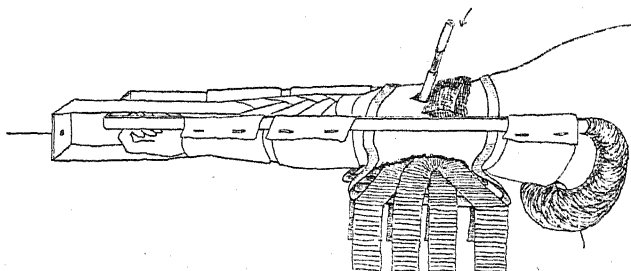


Fig. 60.—Irrigation of the inverted funnel wound. Notice the 'saddle-flange' used to maintain the outflow bandages in position.

led from the depth of the wound straight downwards, with their ends dipping into water in a pail on the floor (*Figs. 59 and 60*). The latter expedient aids, by the action of gravity and capillary attraction, the

leading away of fluid and discharges. If the exit wound faces upward (upright funnel), the fluid is carried by a number of widths of bandage passing from the depth of the wound upwards over the margin of the wound, and falling thence to the level of the floor, where their ends similarly dip into water. The fluid and discharges are thus siphoned out of the wound. (*Fig. 61.*) In the case of the lateral

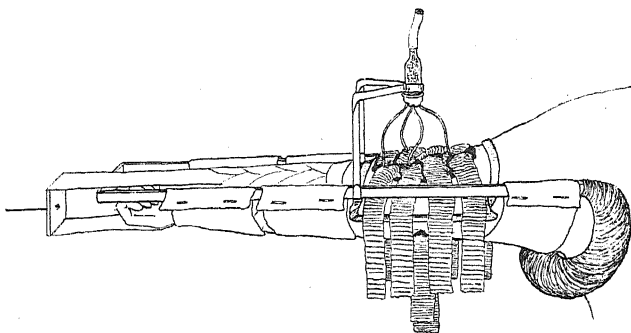


Fig. 61.—Irrigation of the upright funnel wound. Notice the rose-irrigator and the 'saddle-flange.'

funnel wound, the irrigation system is arranged in the same way as in the case of the upright funnel.

In tubular wounds the stream is led into the wound by a rubber tube passing to the centre of the wound. If the wound is vertical, the stream is introduced from above; if horizontal, from the most convenient side. The irrigation of the wound and the outflow are provided for by a number of widths of bandage passing from the

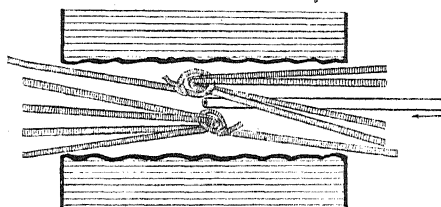


Fig. 62.—The method of irrigating a tubular wound.

centre of the wound outwards through both openings. This is most practically accomplished by attaching the many widths to a single width, by which they are drawn to the centre of the wound (see *Fig. 62.*)

(*B*) *Non-perforating Wounds.*—The entering stream is introduced along a single width of bandage enclosed in a rubber tube to the extreme limit of the cul-de-sac. The liquid is brought into contact with the walls of the wound, and is led away from the wound by widths of bandage sufficient in number to cover the surfaces of the wound.

These widths of bandage are led down to the floor level and dip into water; they act in the case of an ascending wound by direct drainage, in the case of a descending wound by siphonage.

The irrigating plant is made as follows: A metal or glass irrigation-can is suspended at a convenient height above the level of the bed.

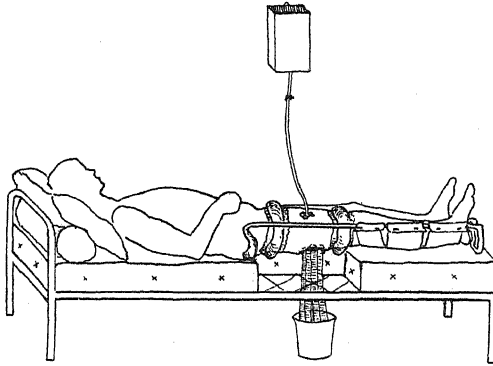


Fig. 63.—Irrigation of inverted funnel wound of the thigh. Immobilization of limb by Page's splint. Formalin-gelatin flanges above and below wound to prevent wetting of the bed. 'Biscuit' removed from bed.

To the exit tap is attached an indiarubber tube which is threaded with a single width of bandage. The many widths of bandage which serve as drains are tied to the lower extremity of the single width. Or, in the case of the rose-irrigator, the junction is made in the glass bulb of this apparatus. The irrigating fluid should be introduced into the can at a temperature of about 140° F. so that it shall reach

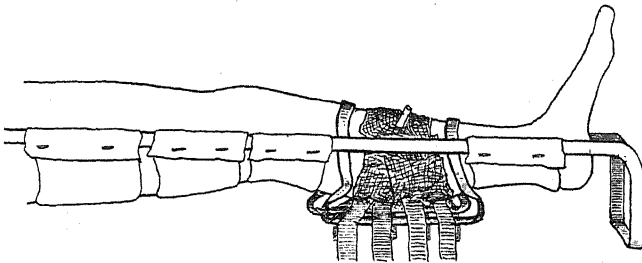


Fig. 64.—Irrigation of inverted funnel wound of lower extremity. Notice the metal 'saddle-flange' arranged to prevent wetting the bed by directing the streams along desired channels.

the wound at body temperature. The rate of flow of the liquid can be regulated by raising or lowering the can, or by means of a screw pinch-cock placed on the rubber exit tube.

A difficulty of all irrigation systems is to lead away the fluids along desired channels, and to avoid the formation of accessory streamlets which trickle in inconvenient directions, wetting the bed, and render-

ing the patient uncomfortable. This difficulty has been overcome by the erection of dams directed either against the formation of such streamlets, or towards guiding them along convenient channels. They are easily made by placing a roll of cotton-wool in the required position, and leading over this roll strips of bandage steeped in liquefied gelatin (20 per cent), to which has been added commercial formalin in the proportion of 1 to 10. In about ten minutes the formalin-gelatin sets, makes firm union with the skin, and there results a rigid waterproof barrier (*Fig. 63*). Another method, especially applicable to the drainage of certain wounds of the extremities, is to place a frame of malleable metal saddle-wise over the limb, and to lead the bandages away over this frame (*Fig. 64*).

Irrigation of the wound should be continued for periods of two or three hours at a stretch during the daytime. At night it is wise to discontinue the flow between 11 p.m. and 6 a.m., so as not to interfere with the patient's sleep.

When hypertonic salt solution is first introduced into the wound some pain may be complained of, but this is never severe and rarely lasts long. It may reappear when the sloughs begin to separate, and should then be regarded as an indication for reducing the salt concentration. It is advisable to protect the edges of the wound by smearing the skin with vaseline, otherwise irritation may supervene. Occasionally capillary bleeding results from the application of hypertonic salt solution. Within reason this may be beneficial and accelerate the cleansing of the wound. If excessive, it can be readily controlled by reducing the concentration of the salt.

If the irrigation achieves its purpose, the wound cleans rapidly and healing begins. Healthy granulations appear, the epithelium grows over, and cicatrization completes the process. In wounds of larger size the healing may be accelerated by bringing opposed surfaces together by means of deep sutures.

4. *The Stage of Chronic Localized Sepsis*.—Partly owing to a lack of certain therapeutic agents against streptococcal and staphylococcal infection, and partly because of limitations in nature's methods of healing, the cleansing of the wound is sometimes delayed, and the condition becomes one of chronic localized sepsis. Various surgical procedures may be invoked at this stage, but this is not the place for their consideration. Vaccine therapy offers prospects of success in this direction. Tidy¹⁷ has recently drawn attention to this method of treatment as the result of his experience in the treatment of severe or indolent cases. He recommends that the measurement of the action of the vaccine should be by observation of the temperature chart, the amount of the discharge, the general appearance of the patient, the pulse, and appetite. He suggests the following initial doses: *Streptococcus* vaccine, 1 to 2 million; *Staphylococcus aureus* vaccine, 30 million; *Bacillus coli* vaccine, 30 million; *Coliform bacilli* vaccine, 2 to 5 million. As a rule, five days should be allowed between successive doses. When a case is progressing satisfactorily,

each successive dose should be 50 per cent larger than the previous one. But no hard-and-fast line can be laid down, and each case must be considered on its merits. No such thing as routine treatment should be admitted.

THE TREATMENT OF TETANUS.—Sir David Bruce¹⁸ has recently analyzed the cases of tetanus treated in home military hospitals from August, 1914, to August, 1915. He arrives at the following conclusions : (1) In the 231 cases of tetanus under review the mortality was 57·7 per cent ; (2) Cases with a short incubation were more fatal than those of longer incubation ; (3) Most cases occurred on the tenth day after the wound ; (4) There are few allusions to the use of antitetanic serum as a prophylactic ; (5) In regard to the therapeutic effect of antitetanic serum, the evidence would go to show that this action was not well marked ; (6) If antitetanic serum is used—and in such a fatal disease it would seem wrong not to give the patient the benefit, even if doubtful, of the antitoxin—it ought to be injected in the first place intrathecally, as this method would seem to possess advantages over the intravenous and subcutaneous methods ; (7) There is no evidence that any benefit accrued to the cases treated by carbolic acid or magnesium sulphate injections ; (8) To sum up, the treatment of a case of tetanus might be as follows : (a) Place in a quiet and darkened room under care of a sympathetic and capable nurse ; (b) The best surgical treatment of the wound should be thoroughly carried out to ensure the prompt and complete removal of all septic products ; (c) The intrathecal injection of at least 3000 units of antitetanic serum. At the same time 10,000 to 20,000 units may be injected intravenously and subcutaneously. This procedure to be repeated frequently as the course of the disease seems to demand ; (d) In addition to this, the patient should receive sedative drugs, as chloral or chloretone, in full doses.

Seeing that all the wounded now receive a prophylactic dose of antitetanic serum, the question of *anaphylaxis* has to be considered when a second dose is about to be administered. The following suggestions are taken from the memorandum on the treatment of injuries in war, issued by the War Office :—"Symptoms of this grave condition are well known in animals to follow the administration of a second dose of the same serum when the lapse of time between the two doses exceeds ten or twelve days. There was some reason to fear its occurrence in men who had received a preventive dose of tetanus serum after being wounded, and who, on account of the development of the disease after an interval of twelve days or more, were given therapeutic doses of the same serum. Again, a large number of men who have returned to the front after recovery from a wound are again injured, and the question has been raised as to the possible danger of giving another preventive dose of serum after an interval of some weeks or months. It is, however, well known that man is much less sensitive to anaphylaxis than the guinea-pig and the rabbit, and this has been fully borne out by the experience of this war. In spite of

close inquiries on the subject, no certain instance of true anaphylaxis has been recorded. The few cases which have been mentioned in reports have, on investigation, turned out to be instances of serum-sickness and to have had no grave results. It does not, therefore, appear to be justifiable to withhold the serum in the case of a man wounded for the second time; at all events, it appears better to run the small and chiefly theoretical danger of anaphylaxis than the very grave one of tetanus.

"In cases in which there is reason to fear the occurrence of anaphylactic shock, various procedures have been recommended to lessen the danger. The majority of these are 'fractional' methods of administering the serum, a preliminary inoculation of 2 or 3 drops of serum being given, in dilution, followed in five minutes by a dose of 0.5 c.c. If no untoward symptoms result, it is said that the full dose may safely be inoculated ten minutes later. A similar fractional method has been advised if the intravenous or intrathecal methods are selected, but there has been no opportunity of judging of their value. Administration of the serum under chloroform anaesthesia is also said to lessen the danger. If symptoms of shock should develop, in spite of these precautions, adrenalin has been stated to be useful, given intravenously in high dilution if the symptoms are urgent; hypodermically in less urgent conditions, in doses of a few minims of a 1-1000 solution."

I am much indebted to my friend Dr. H. H. Tanner, R.A.M.C., for his great skill and care in the preparation of the illustrations for this article. The specimens from which the coloured drawings were made are my own.

REFERENCES.—¹*Lancet*, 1915, ii, 638; ²*Ibid.* i, 1222; ³*Comptes Rendus Soc. de Biol.* 1914, Oct. 31; ⁴*Lancet*, 1915, ii, 376; ⁵*Proc. Roy. Soc. Med.* 1915, Mar. 30; ⁶*Brit. Med. Jour.* 1915, ii, 318; ⁷*Lancet*, 1915, ii, 165; ⁸Private communication; ⁹*Ibid.*; ¹⁰*Jour. R. N. Med. Service*, 1915, i, No. 2; ¹¹*Lancet*, 1915, i, 961; ¹²*Loc. cit.*; ¹³*Loc. cit.*; ¹⁴*Brit. Med. Jour.* 1915, ii, 129; ¹⁵*Ibid.* 317; ¹⁶*Lancet*, 1915, ii; ¹⁷*Ibid.* 326; ¹⁸*Brit. Med. Jour.* 1915, ii.

Part IV.—Miscellaneous.

PUBLIC HEALTH:

INCLUDING

- I. MEDICO-LEGAL AND FORENSIC MEDICINE.
- II. STATE MEDICINE (INCLUDING LEGAL DECISIONS).
- III. INDUSTRIAL DISEASES AND TOXICOLOGY.
- IV. SCHOOL MEDICAL SERVICE.

EDITED BY JOSEPH PRIESTLEY, B.A., M.D., D.P.H.

Medical Officer of Health, Metropolitan Borough of Lambeth.

I. MEDICO-LEGAL AND FORENSIC MEDICINE.

ALLEGED NEGLIGENCE (CONSUMPTION).

In the King's Bench Division of the High Court, a firm of chemists and mineral water manufacturers were sued by a clerk, to recover damages for personal injuries received by him, due to the alleged negligence of the firm in allowing him (the clerk) with two other persons to share the same room with the secretary of the firm, who was admitted to be suffering, at the time, from consumption (laryngeal), which afterwards proved fatal. The clerk alleged that, from this source, he contracted consumption of the lungs. In defence, it was stated that it was not known, at the time, that the secretary was suffering from consumption, whilst the room, in which the four persons were at work together, was exceptionally well ventilated and of a cubic capacity more than sufficient for four workers. The Jury found a verdict for the defendants (the firm), the Judge expressing the opinion that there was not the slightest justification for the very serious allegation.

BRITISH PHARMACOPŒIA CHANGES.

The New (1915) Pharmacopœia increases the strength of the tincture of opium (*laudanum* as it is also called) from 0.75 to 1.0 per cent of morphine, and, consequently, brings it within Part I of the Schedule of Poisons, rendering the signing of the poison book necessary in every sale in addition to the usual labelling—a very important change from a point of view of medico-legal consideration, where the poison is sold in the form of so-called *laudanum*. Tincture of *nux vomica*, on the other hand, is reduced in strength, and, consequently, when a sale is effected, the poison book need not be signed, though the drug itself must be labelled with its name, the word 'Poison,' and the name and address of the seller, in every case.

GARNISHEEING OF A PANEL DOCTOR'S EMOLUMENTS.

A County Court Judge made an order to allow a firm of wholesale chemists to garnishee a sum of money due to a panel doctor from an Insurance Committee—part of the medical fees due but not yet ascertained by such Committee.

WATER CHARGES FOR WASHING MOTOR CARS.

As a principle (supported by legal decision) it may be stated that water used for washing a carriage or motor car used by a medical man in connection with practice is not water used for a trade or business, and, consequently, a water company, unless specially empowered by statute to do so, cannot make an extra charge outside the usual domestic water rate. In London, and throughout the area supplied by the Metropolitan Water Board, such special powers have been obtained and have been in force since 1907. Other water companies in other areas have also obtained special powers in the same way. It should not be assumed, however, that all water companies have similar special powers, and individual inquiries should be made in each case, and, where there is any doubt, the water company's authority should be demanded. The domestic supply includes all the ordinary and reasonable purposes of domestic life, including baths, water-closets, watering of gardens, washing of carriages or motor cars which are kept for private use—but only in the absence of special provision in a special Act to make specific charges for specific uses. The trade supply is quite another matter, and can be charged for *extra* in the usual way.

WORKMEN'S COMPENSATION ACT.

Position of an Assessor (Medical).—The Master of the Rolls, in the case of *Lewis v. Port of London Authority*, stated as follows: "There does not appear to be any doubt as to the position of the assessor (medical). He was compared, and rightly, I think, to a nautical assessor, an elder brother in the Admiralty Courts, and there is no doubt about his function. He is there to give his advice—in the one case upon nautical matters, and in the other case upon medical matters. He is not there to give a judgement or to find the facts, and his advice is no part of the judgement, and may be disregarded by the Judge, as it has been in the Admiralty Court on not very infrequent occasions."

Capacity of a One-eyed Stone-cutter.—A stone-cutter lost an eye, which was struck by a small splinter of steel, which flew off his chisel whilst at work. Liability to compensation was admitted by his employers, who, at the end of nine months, offered to take him back to work. The offer was declined, and an action raised by the employers to reduce the amount of compensation in consequence. The Sheriff found that full vision was necessary in fine stone-cutting work, and that therefore the workman, with his one eye, had not the same capacity for work, either as regards its quantity or quality, as previously, i.e., when he had the use of both eyes; whilst he would be handicapped in getting employment elsewhere, should he be discharged from, or have to leave for any reason, his present firm. The Sheriff, consequently, refused to reduce the amount of compensation.

II. STATE MEDICINE, INCLUDING LEGAL DECISIONS.

COMPULSORY NOTIFICATION OF MEASLES AND GERMAN MEASLES.

Measles has long been regarded as a dangerous infectious disease, in that it causes annually a large number of deaths and a large amount of ill-health and permanent injury amongst the very young. The cause of the disease (i.e., the germ) has not yet been found; but a serious endeavour is now being made in the Marcus Beck Laboratory of the Royal Society of Medicine—the Medical Research Committee, appointed under the National Insurance Acts, paying the necessary expenses. Sir Ronald Ross is the honorary director.

Meanwhile, an Order, dated Nov. 27, 1915, has been issued by the Local Government Board, making the notification of measles and German measles compulsory throughout England and Wales. The order came into force on Jan. 1, 1916. There is a dual notification imposed, viz.: (1) Upon medical practitioners, and (2) Upon parents or guardians or other persons in charge of the patients; but a medical practitioner is not required to notify, if a previous case of the same disease has been already notified in the same household or institution during the preceding two months. Upon the receipt of the notification, the Medical Officer of Health is required himself, or by an officer acting under his instructions, to make inquiries and take steps for investigating the source of infection, for preventing its spread, and for removing conditions favourable to it.

Medical assistance, including nursing, etc., for the poor, suffering from measles or German measles, can be provided by local authorities under the Order.

Hospital isolation for some, at least, of the cases is desirable, and leaflets dealing with the diseases and their simple means of treatment should be freely distributed at infected houses or in infected neighbourhoods. Different opinions are held as to the value of compulsory notification of measles, having regard to the infectious nature of the *prodromal* symptoms, the difficulties in diagnosing the disease in its early stages, and the age-period of the patients generally affected, etc. One great object of the Order is to draw attention to the dangerous nature of measles and German measles, and the folly of belittling them. The diseases are showing a tendency to spread amongst the adult population, owing to the visiting and revisiting of soldiers and sailors for short periods of time at infected houses. Measles and German measles are *not* "diseases to be got over, and the sooner the better." Precautionary measures must be taken, so as to lessen the resulting mortality and morbidity. Careful nursing is essential.

THE FLY PERIL.

During the past year, war has been waged even more bitterly against the fly, which is now recognized as a potential and actual carrier of infectious diseases, e.g., typhoid, diarrhoea, tuberculosis, etc. The *Musca domestica*, the blow-fly, and the lesser house-fly have definite life histories, the most important part of which is the extreme rapidity of reproduction. The *Musca domestica* or common house-fly can produce 900 eggs, and the life of a generation is three

weeks. The blow-fly has a much longer life, and produces a lesser number of eggs, viz., only 600, whilst the lesser house-fly is not a settler on human food and consequently is less dangerous than its *confrères*. How the disease germs may be and are actually carried is now well known, but how best to attack the enemy and destroy him is not so well understood. It is useless to await his arrival and then to 'swat' him; better to seek out and destroy the breeding-grounds—moist places and stagnant pools in connection with manure and refuse heaps. No dirt, no fly. No wetness, no fly larvæ. Burning of refuse of all sorts is the best. For treating manure, in which flies breed, chloride of lime (20 per cent solution), borax ($1\frac{1}{4}$ lb. per eight bushels of manure), and sulphate of iron (20 per cent solution) are praised as certain larvicides, whilst, for indoor use, open receptacles, containing a solution of formalin (1 tablespoon of formalin to the pint of water) with the addition of a little bread or sugar or milk, will attract and kill flies; but such receptacles must be placed in light places and not in dark corners. Posters and circulars have been issued and distributed in their thousands by different sanitary authorities, and even the cinematograph theatres are doing their share in helping the campaign against flies by teaching pictorially very valuable lessons as to their life-histories and the means of destroying them.

An interesting point in the life-history of the *Musca domestica* may be added, viz., that this fly does not appear to hibernate in the form of a fertilized female, which survives the winter months in a state of torpor hidden away in some crevice or sheltered crack in an unfrequented tool-house or other outbuilding—or, at least, very exceptionally, and certainly not as a rule as is generally supposed. There is considerable doubt as to the method in which the interval between one fly season and another is bridged over; it may be that it is the *pupa* that survives the cold of winter.

Fermenting horse-dung is the natural enemy of the fly, the eggs not being able to withstand a temperature of 60° C.—a temperature attained in manure that is kept covered up from the cold and is allowed to ferment. The absence of light in such a covered manure-pit is also of advantage as an indirect larvicide.

THE 'GLAGSESTEN' THEORY IN WATER STORAGE.

'Glagsesten' is the name given by Dr. A. C. Houston, Director of Water Examination to the Metropolitan Water Board, London, to such factors as the influence of glass on bacteria, and the effect of agglutination, sedimentation, sticking, and enshrouding processes in connection with the storage of impure water, such processes devitalizing the undesirable bacteria owing to their finding water a most unsuitable medium for their sustained activity. Storage of impure water is well known to be a process making for safety in connection with water purification, and the property of glass in imparting certain constituents (insoluble though they be) to water assists in the devitalization process.

Agglutination or clumping together of bacteria undoubtedly acts beneficially, as does also sedimentation (with sticking). Enshrouding, in Dr. Houston's opinion, acts also, but to a lesser extent, beneficially. Expert opinion as to the value of storage, and the importance, therefore, of providing means for such storage, are matters that all water

companies or boards realize, and, whilst filtration is still regarded as an important defence against impure water being injurious to consumers, storage is regarded as equally necessary for the same purpose.

LIGHTING OF FACTORIES AND WORKSHOPS.

The report of a departmental committee of the Home Office on the subject of the lighting of factories and workshops has recently been published, and goes to prove what has been well known to experts, that the effective lighting of factories and workshops is a matter of great importance, not only from the health standpoint of the workers, but also from the point of view of the output of work. Good lighting, the report states, must include the following: (1) Adequacy; (2) A reasonable degree of constancy and uniformity of illumination over the necessary area of work; (3) The placing, or shading, of sources, so that the light from them does not fall directly on the eyes of an operative when engaged in work or when looking horizontally across a room; (4) The placing of lights so as to avoid the casting of extraneous shadows on the work. Half- or ill-lighted rooms cause eye-strain and afterwards nerve-strain, leading to consequent defective output of work—a consideration for employers. Closely connected with lighting are the heating and ventilation of workrooms.

MATERNITY AND CHILD-WELFARE CENTRES.

One point that the War has emphasized is the need for taking precautionary measures to limit the present wastage of infant life. Every endeavour must be used to secure such an object. The Local Government Board has given the lead to sanitary authorities by issuing a circular letter, giving an outline of organization. This outline suggests that any maternity or child-welfare scheme should comprise:—

1. Arrangements for—(a) The local supervision of midwives.
2. Arrangements for—(a) Antenatal clinic for expectant mothers; (b) Home visiting of expectant mothers; (c) A maternity hospital or beds at a hospital, in which complicated cases of pregnancy can receive treatment.
3. Arrangements for—(a) Such assistance as may be needed to ensure the mother having skilled and prompt attendance during confinement at home; (b) The confinement of sick women—including women having contracted pelves or suffering from any other condition involving danger to the mother or infant—at a hospital.
4. Arrangements for—(a) The treatment in a hospital of complications arising after parturition, whether in the mother or in the infant; (b) The provision of systematic advice and treatment for infants at a 'baby clinic' or 'infant dispensary;' (c) The continuance of these clinics and dispensaries, so as to be available for children up to the age when they are entered on a school register, i.e., the register of a public elementary school, nursery school, crèche, day nursery, school for mothers, or other school; (d) The systematic home visitation of infants and of children not on a school register as above defined.

The value of such an *ideal* scheme cannot be gainsaid, and the newly-passed Notification of Births (Extension) Act, 1915, which came into force on Sept. 1, 1915, will prove valuable in connection

with child-welfare work. Grants are made to sanitary authorities and voluntary organizations by both the Board of Education and the Local Government Board. This dual control has led to overlapping and some confusion; but, fortunately, a joint circular has recently been issued by the two departments with an endeavour to correct such confusion and prevent such overlapping for the future. The following are the arrangements :—

1. The Local Government Board will pay grants in respect of approved institutions or agencies provided by a sanitary authority (or county council acting through its public health committee) or for the work of which a sanitary authority (or county council) takes entire financial responsibility. These grants to institutions will be made under the general heading of 'grants for maternity centres.'

2. The Board of Education will pay grants in respect of schools for mothers, subject to the following qualifications :—

- i. That an institution will not be recognized as a school for mothers unless collective instruction by means of systematic classes forms an integral part of its work.
- ii. That a grant will only be paid in respect of 'infant consultations' which are provided for women attending a school for mothers.
- iii. That a grant will only be paid in respect of expenditure on 'home visiting' of children registered at a school for mothers, if neither the sanitary authority nor county council undertake to arrange for such visiting.
- iv. The fact that a school for mothers receives a grant or assistance from a sanitary authority (or a county council) or its officers will not disqualify it from receiving a grant from the Board of Education.

3. The Local Government Board will pay grants in respect of voluntary 'infant consultations,' which are not aided by the Board of Education as schools for mothers, only if they are directly connected with the work of a sanitary authority (or a county council). Joint aid by both Government departments is not precluded.

Regulations as to payments of grants for the year 1915-16 have been issued by both Boards, dealing with the payments of such grants in respect of the following services :—

1. Local Government Board.

- i. The salaries and expenses of inspectors of midwives.
- ii. The salaries and expenses of health visitors.
- iii. The provision of a midwife or doctor for the aid in confinement of necessitous women.
- iv. The expenses of a maternity centre, i.e., an institution providing all or any of the following activities, viz., medical supervision and advice for expectant and nursing mothers and for infants and little children, and medical treatment for cases needing it.

2. Board of Education.

Schools for mothers in respect of the provisions made for promoting the care, training, and physical welfare of infants and young children, including systematic classes, home visiting, and infant consultations—the provision of specific medical and surgical advice and treatment (if any) to be only incidental.

The grants may be as much as one-half of the approved expenditure.

SEWAGE DISPOSAL.

The Royal Commission has reported. It was appointed in 1898, and has issued in all ten reports—the last or 'Final Report' being dated Feb. 11, 1915.

The establishment of a central authority, either a separate body or a new department of the Local Government Board, is recommended—to be a Supreme Rivers Authority, dealing with matters relating to rivers and their purification. Rivers boards and rivers committees of county councils would be controlled by, and act under, the central authority, which would control the standard of purity to be insisted upon in any sewage or sewage effluent discharged into a stream, due regard being had to the volume of water in the stream as compared with the volume of the effluent and the purity of the stream water above the outfall. A 'general standard' set up is as follows: That an effluent must not contain as discharged more than 3 parts per 100,000 of suspended matter, and with its suspended matters must not take up at 75° F. more than 2 parts per 100,000 of dissolved oxygen in five days, in the case of a stream neither exceptionally polluted already nor exceptionally pure, and having a volume at least eight times greater than that of the discharge. If the dilution of the stream is very low, a more stringent standard might be necessary, and vice versa. These would be of the nature of 'special standards.' Neither standard ('general' nor 'special') would apply to storm-water sewage or to tidal waters generally.

How can the required degree of purification to bring an effluent up to standard be best effected? And what difference is necessary in the case of trade effluents mixed with sewage? These two questions are dealt with fully in the reports, and the terms discussed on which a local authority should be compelled to receive such effluents. All trade effluents interfere with or retard, more or less, processes of purification; but, notwithstanding this fact, the Commissioners state that they are not aware of any case where the admixture of trade refuse makes it impracticable to purify the sewage upon land or by means of artificial processes, although, in certain exceptional cases, processes of preliminary treatment may be necessary. Speaking generally, a considerable proportion both of the grit and suspended matters should be removed from the sewage before attempting to purify such sewage on land or filters by means of quiescent sedimentation tanks, continuous flow sedimentation tanks, septic tanks, and chemical precipitation tanks. The real purification of the sewage is effected by filters or by treatment on land. It will be noted that the latter may be an *alternative*, and not, as is at present held in Government departments, a supplementary process. On this point the Commissioners speak with no uncertain voice. It is practicable, they state, to produce by artificial processes alone, either from sewage or from certain mixtures of sewage and trade refuse, effluents that will not putrefy, that would be classifiable as 'good' according to ordinary chemical standards, and that might be discharged into a stream without fear of nuisance, and in connection with which the Local Government Board would be justified in modifying, under proper safeguards, the present rule as regards the application of sewage to land. Percolating filters and contact beds are the two

generally-recognized artificial processes or filters. Of course, if there is available sufficient good land to which the sewage will gravitate, and such land can be bought at £100 per acre, land treatment is the cheaper method, but clay or peat land is practically useless unless 'top-soiled' to a depth of not less than six inches.

For storm-water sewage, special stand-by tanks are recommended, thereby securing, at least, settlement of the sewage prior to its discharge into a stream; and storm overflow sewers should not be allowed, except in very exceptional cases, which should be, in every instance, sanctioned by the central authority or rivers boards or rivers committees of county councils. The ordinary filters should be made large enough to treat a considerable portion of any storm-water sewage that may require treatment.

Trade effluents should be dealt with by the local authorities, which, for that purpose, should be compelled to provide such sewers as are necessary. Preliminary treatment to standard would, in addition, be required on the manufacturers' own premises.

The subject of manufacturing wastes which cannot be taken into sewers are dealt with in the reports at great length—twenty-eight industries being specifically dealt with as to standards of purity necessary, etc. Adequate reduction of solids in suspension and removal of dissolved impurities are recommended in some; in others, efficient purification is stated to be impracticable in the present state of knowledge, e.g., gas and coke production and sulphite cellulose manufacture.

Finally, the treatment of distillery waste, and the desirability of the practice of 'sludging' mill dams being prohibited or restricted, are dealt with in the reports, together with many subsidiary topics, such as the problem of the disposal of domestic refuse in rural areas (water-carriage *v.* conservancy systems), the dangers of pollution of tidal waters and the subsequent and consequent pollution of shell-fish layings, etc.

PUBLIC HEALTH (SHELL-FISH) REGULATIONS, 1915.

These came into force on March 1, 1915, by Order issued by the Local Government Board in pursuance of the Public Health (Regulations as to Food) Act, 1907. The regulations prohibit the sale of shell-fish likely to cause danger to the public health. It is well known that shell-fish are grown or fattened in polluted waters, and that, in consequence, a considerable number of cases of enteric fever and of other illnesses may be caused in persons consuming such polluted shell-fish. Further powers are needed for sanitary authorities, and new legislation will be required; but in the meanwhile it is thought that the new Order may assist matters. The Fishmongers' Company was consulted before the Order was made by the Board.

Power is given under the regulations to close shell-fish layings in regard to which there is evidence to show that shell-fish from such layings have actually caused infectious or other disease, or are likely to be a source of danger to public health. The power to close is vested in the sanitary authority of the district in which the layings are situated, with a right of appeal in particular cases to the Local Government Board, and such sanitary authority *must* act on receipt of a representation from another local authority in whose district

the shell-fish are consumed, indicating that the shell-fish have caused or are likely to cause infectious or other disease, or, on the report of their own medical officer of health, if such shell-fish are found in their own district.

The medical officer of health of any district in which layings are situated must examine the conditions of such layings, and report as required to his authority all cases in which the layings are so situated as to be liable to dangerous contamination, with a view to steps being taken under the regulations to prevent shell-fish being distributed for sale for human consumption from such layings unless and until the shell-fish have been relaid in fresh water for a period sufficient to free them from contamination—not less than fourteen days. The Board suggest that any action taken with a view to the closing of a suspected laying should be based rather on epidemiological and topographical considerations than on the results of bacteriological analysis—an opinion shared by the Sewage Commissioners in their 4th report in the following words: “The closing of a foreshore, laying, or pond should not depend, as a matter of routine, on the results of a bacteriological examination.” As a fact, speaking generally, where outbreaks of infectious disease have been traced clearly to shell-fish, the foreshores, layings, or ponds from which the shell-fish have been procured, have been so situated that the opportunities for pollution by sewage have been both obvious and indisputable. If such manifestly dangerous layings are dealt with, much good must accrue from the new regulations—not only in England and Wales, but also in Ireland.

LEGAL DECISIONS.

The following legal decisions, published during 1915, are important in their relation to State Medicine and Sanitary Administration:—

ADULTERATION OF FOOD AND DRUGS.

Winterbottom v. Alkwood (King's Bench Division).

Sale of Food and Drugs Act, 1875, ss. 6, 14—Sardines in oil—Method of sealing divided parts of sample.

The procedure under the Sale of Food and Drugs Acts is to divide the article (purchased for analysis) into three parts—each part to be “sealed or fastened up in such manner as its nature will permit.” Tins of sardines in olive oil (which proved on analysis to be cotton-seed oil) were purchased by the inspector, opened, and the contents put in three jars, which were covered with grease-proof paper and sealed—one of the jars being handed to the vendor, who, after being served with a summons, sent his jar for its contents to be analyzed. The analysis could not be carried out owing to the condition of the contents of the jar—an interval of a month having elapsed since the purchase was originally made by the inspector. It was contended that both the sardines themselves and the oil in which they were packed should have been separately divided into three parts, and sealed up so as to be imperishable. The Magistrate convicted, and, on appeal, the conviction was upheld on the ground that the oil

and the sardines were to be regarded not as separate articles but as one article, and that it was not necessary for the divided samples to be sealed up so as to make the contents imperishable—reasonable care in sealing having been exercised. *Appeal dismissed.*

Clifford v. Battley (King's Bench Division).

Sale of Food and Drugs Act, 1875, s. 8—Notice of mixture by label—Attention of purchaser need not be specifically drawn to the notice.

A sample of coffee was purchased by an inspector, and was served in a labelled wrapper to which, however, the inspector's attention was not drawn by the vendor. A summons was taken out, but the Magistrate dismissed it. On appeal, the Magistrate's decision was upheld, on the ground that it was not necessary for a vendor to draw the attention of a purchaser specifically to a labelled wrapper in which the article sold may be purchased. *Appeal dismissed.*

Haynes v. Davis (King's Bench Division).

Sale of Food and Drugs Act, 1899, s. 19—Copy of analyst's certificate must be served with the summons.

A summons was dismissed owing to the fact that a copy of the analyst's certificate had not been served with the summons. A new summons was taken out, and a copy of the certificate sent with the summons. The Magistrate convicted. On appeal, however, this conviction was quashed, on the ground that the vendor had been in peril of conviction on the first summons, and was entitled to the benefit of a plea of '*autrefois acquit*' on the second summons.

Appeal allowed and conviction quashed.

McNair v. Terroni (King's Bench Division).

Sale of Food and Drugs Act, 1875, s. 17—Milk exposed for sale in pan on counter and only sold with other articles is exposed for sale within the meaning of the Act.

Milk was found placed in a pan on the counter of an eating-house, to be used only with tea, coffee, cocoa, or soda-water. The pan was labelled 'pure milk.' An inspector asked for a glass of the milk, but was refused. A summons was taken out for refusal to sell, and the summons was dismissed by the Magistrate on the ground that the milk was not exposed for sale or to be sold by retail within the provisions of Section 17 of the Sale of Food and Drugs Act, 1875. On appeal, the Magistrate's decision was not upheld, and the case was remitted to the Magistrate with a direction to convict.

Appeal allowed and case remitted.

Anness v. Grivell (King's Bench Division).

Sale of Food and Drugs Act, 1875, s. 6—Sale of Food and Drugs Act, 1899, s. 8—Small proportion of butter in margarine and butter mixture is not to the prejudice of the purchaser if sold even at a high price.

A mixture of margarine (80 per cent), butter fat ($4\frac{1}{2}$ per cent), and water, curd and salt ($15\frac{1}{2}$ per cent) was sold for $1\frac{1}{2}$ per lb., and the Magistrate convicted on the ground that the mixture was a colourable one. On appeal, the Magistrate's conviction was quashed, it

being held that the word 'quality' in the section of the Act meant commercial quality, but that the 10 per cent limit of butter in margarine mentioned in the Act must be taken into account in taking into consideration the quality that a purchaser has a right to expect.
Appeal allowed and conviction quashed.

BYLAWS.

Attorney-General and the Wirrall Rural District Council v. Kerr and Ball (King's Bench Division).

Contravention of building bylaws—No nuisance proved—Right of Court to refuse interference.

Certain bungalows were built on low-lying ground near a sea wall, and the land lay on sandy soil below the level of the tide, thereby rendering a drainage system impracticable. The bungalows were erected without the consent, and not in conformity with the bylaws, of the Sanitary Authority. Complaints were raised by inhabitants of the district as to the use to which the land was put, but no evidence was produced as to a nuisance or a danger to public health. *Held*, that the granting of an injunction on the application of the Attorney-General at the relation of a District Council is in the discretion of the Court, which will not generally interfere unless a public injury be done.
Judgement for the Defendants.

CRIMINAL LAW.

Rex v. Hopper (Court of Criminal Appeal).

Criminal law—Murder or manslaughter—Duty of Judge to put to jury questions arising out of the evidence—Provocation—Verdict of murder by jury.

Held, that there was evidence of such provocation as would have justified a verdict of manslaughter, and that the Judge ought to have directed the jury on the point, and that, as the Judge had not done so, a verdict of manslaughter should be substituted for that of murder under Section 5 (2) of the Criminal Appeal Act, 1907.

Sentence varied accordingly.

FACTORIES AND WORKSHOPS.

Pursell v. Clement Talbot, Limited (Court of Appeal).

Factory and Workshop Act, 1901, s. 10 (1) (c)—Fencing in of machinery (all dangerous parts)—Liability of owner.

Held, that Section 10 (1) (c) of the Factory and Workshop Act, 1901, imposes absolutely upon owners of factories an obligation to fence in all dangerous parts of machinery in such a way as to render such machinery safe to the workpeople employed, *whichever way the machines themselves are worked.*
Appeal dismissed.

HOUSING AND TOWN PLANNING.

Jackson v. Knutsford Urban District Council (Chancery Division).

Housing of the Working Classes Act, 1890, ss. 29, 38 (1), (4), (5), (6), (7), 39, 41, and Housing, Town Planning, etc., Act, 1909, ss. 46, 49, Schedule 2—Workshop as a building to which the 'obstructive building' section applies.

Held, that a separate workshop constructed and used solely as such, and not being a building designed for human habitation, was a building which could be dealt with by a Local Authority under Section 38 of the Housing of the Working Classes Act, 1890, as amended by Section 46 and Schedule 2 of the Housing, Town Planning, etc., Act., 1909. *Action dismissed.*

In re Lancaster and the Burnley Corporation (King's Bench Division).

Housing, Town Planning, etc., Act, 1909, ss. 18, 39 (1)—Demolition Order to follow Closing Order if dwelling-house is not rendered fit for human habitation—Power of Local Government Board on appeal.

Held, that the Local Government Board has a wide discretion, after holding an inquiry, to rescind a demolition order made by a sanitary authority, on any reasonable ground. *Decision accordingly.*

Hall v. Manchester Corporation (House of Lords).

Manchester Waterworks and Improvement Act, 1867, s. 41—Houses 'unfit for human habitation,' owing to neighbouring properties—Closing Order.

The Court of Appeal reversed the decision of the Lancaster Palatine Court on the ground that the provisions of the Act were general and not to be cut down, and that, consequently, an order (closing) could be made upon a certificate that the building was, from any cause whatever, 'unfit for human habitation' (*vide* MEDICAL ANNUAL, 1915, p. 725). This decision of the Court of Appeal was affirmed by the House of Lords. *Appeal dismissed.*

Arlidge v. Scrace and others (King's Bench Division).

Housing of the Working Classes Act, 1890, ss. 51 (1), 89—Housing, Town Planning, etc., Act, 1909, ss. 36, 47 (1), 76 (1)—Entry of house for examination or survey—Resolution of Sanitary Authority—Right of owner or occupier to refuse.

Held, that Section 36 of the Act of 1909 must be construed as forming part of Part II of the Act of 1890, so that a court of summary jurisdiction may make an order under Section 51 (1) of the Act of 1890 to permit of the entry of the Medical Officer of Health for the purpose of carrying out the provisions of the Housing, Town Planning, etc., Act, 1909, and that it is not necessary for the resolution, by which the local authority authorizes the entry, to state the grounds upon which the local authority acted. *Appeal dismissed.*

MIDWIVES.

Stock v. Central Midwives Board (King's Bench Division).

Midwives Act, 1902, ss. 3, 4—Removal of name from midwives' roll for misconduct—Appeal to High Court.

The Central Midwives Board decided upon the removal from the roll of the name of a certain midwife for misconduct—part of the evidence being proved, afterwards, to be inaccurate. On appeal, an order was made for the midwife's name to be restored to the roll, the correct evidence being before the Appeal Court, it being *held*, (1) That the word 'misconduct' in Section 3 of the Midwives Act,

1902, is not limited to misconduct in the discharge of the duties of a midwife; and (2) That, on an appeal under Section 4 of the Act, the High Court is entitled to re-hear the case on its merits.

Appeal allowed.

NATIONAL INSURANCE.

Rex v. County of London Insurance Committee; ex parte Salter
(King's Bench Division).

National Insurance Act, 1911, s. 15 (1) (2).

Held, that a refusal of a panel doctor to supply prescriptions in duplicate, unless he or she is supplied with duplicating books which enable the work to be done with the same amount of labour as writing a single prescription, is not sufficient grounds for removing such doctor from the panel, in the absence of an agreement by such doctor to be liable to such removal from the panel without an inquiry.

Rule absolute.

O'Driscoll v. Manchester Insurance Committee (Court of Appeal).

National Insurance—Medical Benefit—Distribution amongst panel doctors—Debt—Attachment.

Held, that, where a medical practitioner has done work under his agreement, and funds have been received by the local committee for medical attendance and treatment to be pooled and distributed amongst the panel doctors, there is a debt due or accruing from the local committee to the medical practitioner, which is liable to be attached in garnishee proceedings under Order xlv, r. i, and the mere fact that accounts have to be adjusted before the actual amount due is ascertained makes no difference. *Held*, also, that an appeal from the certificate of a Master in garnishee proceedings shall lie to the Divisional Court and not to the Court of Appeal.

Appeal dismissed.

NUISANCES.

Bainbridge and Another v. Chertsey Urban District Council
(Chancery Division).

Nuisance from sewage works—Offensive and noxious smells complained of and no injury or danger to health suggested.

Held, that a smell from sewage works is liable to be restrained by injunction if such smell, as a smell, materially interferes with the ordinary physical comfort of human existence according to the plain and sober notions prevailing amongst English people.

Injunction granted.

OFFENSIVE TRADES.

London County Council v. Bermondsey Borough Council
(King's Bench Division).

Public Health (London) Act, 1891, ss. 1, 19 (1), (8), 100—Offensive trades—Establishing anew—Duty of Metropolitan Borough Council to prosecute, and of London County Council in default of Borough Council.

The Bermondsey Borough Council refused to take action under Section 19 of the Public Health (London) Act, 1891, on the ground that it was the duty of the London County Council to do so with

respect to offensive trades and businesses. The London County Council took action in default, and then issued a summons against the Borough Council under Section 117 to recover expenses. The Magistrate dismissed the summons, and, on appeal, the Magistrate's decision was not upheld, on the ground that it was the duty of the Borough Council to take action under Section 19 of the Public Health (London) Act, 1891. *Appeal allowed. Leave to appeal.*

PUBLIC OFFICIALS.

Wiffen v. Bailey and the Romford Urban District Council
(Court of Appeal).

Malicious prosecution—Action against officers of a Sanitary Authority for issuing a summons which was dismissed under the Public Health Act, 1875.

Under Section 95 of the Public Health Act, 1875, a notice was served for a nuisance due to the want of cleansing of certain rooms. The notice was not complied with, and a summons was issued, but dismissed with costs against the Sanitary Authority. An action for malicious prosecution followed, and the Court awarded £250 damages against the Sanitary Authority and the Sanitary Inspector. On appeal, the appeal was allowed, it being held that there was no damage to the fair fame of the plaintiff, who, furthermore, was not put in peril of losing his liberty, and that, consequently, the action for malicious prosecution was not maintainable.

Appeal allowed and Judgement for Defendants.

Rowsell v. Metropolitan Water Board (King's Bench Division).

Metropolis Water Act, 1902, s. 47—Transfer of officials from private company to Water Board—Right to claim the same wages as before.

Held, that, notwithstanding that the Act provided that the plaintiff should receive not less salary, wages, or pay than he would have been entitled to if the Act had not been passed, there was no right given him by the Act by which he was entitled to say that his rate of pay could never be altered so long as he was performing the same duties.

Judgement for the Defendants.

RAG FLOCK.

Guildford Corporation v. Brown (King's Bench Division).

Rag Flock Act, 1911, s. 1 (1)—Possession of rag flock for putting into new cover is the manufacturing of a mattress.

Held, that it is an offence against the Rag Flock Act to have in one's possession a mattress containing rag flock which does not conform to the prescribed standard, for the purpose of putting such rag flock into a new cover. *Appeal dismissed and case remitted.*

[N.B.—In the case of *Gamble v. Jordan* it was held that there was no offence against the Rag Flock Act if the rag flock was taken out of the cover of a mattress and was put back into the same cover, such an act not being the manufacturing of a mattress (*vide* MEDICAL ANNUAL, 1914, pp. 681–682).]

Cooper v. Evan Cook's Depositories Limited (King's Bench Division).

Rag Flock Act, 1911, s. 1 (i)—Sale of articles containing rag flock not a sale of rag flock within the meaning of the Act.

Secondhand furniture dealers bought a mattress and two pillows and, without having altered or dealt with them, sold them to a customer. The articles contained rag flock which did not conform to the prescribed standard of cleanliness.

Held, that the sale was not a sale of rag flock within the meaning of the Rag Flock Act. *Appeal dismissed.*

SUMMARY JURISDICTION.

Rex v. Rhodes : Ex parte McVittie (King's Bench Division).¹

Summary Jurisdiction Act, 1848, s. 1—Summons—Service—Lock-up shop not a place of abode.

Held, that the words 'place of abode,' mentioned in Section 1 of the Summary Jurisdiction Act, 1848, mean place of residence, and do not include a lock-up shop. *Rules absolute.*

UN SOUND MEAT.

Bothamley and Another v. Jolly (King's Bench Division).

Public Health Act, 1875, ss. 116, 117—Public Health Acts (Amendment) Act, 1890, s. 28—Unsound meat—Sale of diseased bullock (tuberculous) to butcher—Seizure after slaughter on butcher's premises.

A bullock was sold to a butcher, who, on slaughtering it, found it to be tuberculous and unsound. It was seized upon the butcher's premises (in the slaughter-house), condemned, and a summons taken out against the vendors, who were convicted of unlawfully selling to a butcher a diseased bullock. The Magistrates' decision was quashed on appeal, on the ground that the unsound article (*viz.*, the bullock) was not exposed for sale by the vendors, and that therefore they had not committed an offence against the Sections of the Acts. *Appeal allowed and conviction quashed*

III. INDUSTRIAL DISEASES AND TOXICOLOGY.

NOTIFICATION OF INDUSTRIAL POISONING.

The Factory Department of the Home Office has recently issued a memorandum with reference to the certification by medical practitioners of cases in which they believe the patients to be suffering from lead, phosphorus, arsenic, or mercury poisoning, or from anthrax contracted in a factory or workshop. Notification is compulsory, and the fee payable is 2 6—the necessary notification forms being obtainable from the Chief Inspector of Factories, Home Office, London, S.W. The information required by notification is (1) The form of poisoning or anthrax from which the patient is suffering; and (2) Whether such poisoning or anthrax has or has not been contracted in a factory or workshop.

Successive attacks, especially when distinct from the primary attacks, are each to be notified, but cases in which symptoms continue or recur after the employment in dangerous processes has come to an end are not notifiable.

The object of notification is to draw the Factory Inspector's attention to dangerous conditions over which control can be exercised, *but such conditions must exist in connection with factories and workshops within the meaning of the Factory and Workshops Acts.*

PAINT POISONING.

It is now generally admitted by experts that emanations from lead paints contain no appreciable quantity of lead, and that, consequently, the symptoms of paint poisoning are due to other causes than lead, viz., carbon monoxide (the result of oxidation), aldehydes, etc. A large number of carefully-conducted experiments has recently been carried out with a view to confirming or otherwise this latest view. The answer of the experiments is confirmatory. The oxidation products of turpentine and its substitutes, in the form of various kinds of thinners and driers, are responsible. Turpentine consists of a solution of various solids called 'resins' in a liquid called 'oil of turpentine,' and, on dissolving crude turpentine in a current of steam, the essential oil passes over, leaving a residue of resins behind. This essential oil of turpentine, on exposure to moist air, gradually changes, darkening in colour, becoming more viscous, and being finally converted into a variety of oxidation products. Peroxide of camphor is first formed, and this, in the presence of water, breaks up into camphoric acid and peroxide of hydrogen, and finally other bodies, e.g., formic acid, acetic acid, aldehyde, and pinene (a hydro-carbon). These are the substances that cause the symptoms of paint poisoning, which, in its turn, renders the persons affected highly susceptible to *real* lead poisoning, should they be exposed to that metal.

UNCOMMON CASES OF POISONING.

1. *Datura and Hyoscyamus.*

The symptoms are of two types: (a) The maniacal, and (b) The comatose; the former generally due to the taking of the seeds, and the latter to the taking of the leaves—the two forms in which the poison is used. The incubation period varies from ten minutes to two hours, and the symptoms then commence, e.g., boisterous, talkative, and inattentive mania, or unconsciousness, varying from mild stupor to profound coma with loss of conjunctival and corneal reflexes; face slightly flushed or even cyanosed; skin dry and hot; low temperature at first from collapse; retention of urine after a few days, with constipation throughout the attack; low tensioned and rapid pulse; dilated pupils, with sluggish mobility; tongue dry and tremulous, and throat congested. The symptoms persist for two or three days, and then the patient suddenly improves, but the return to normal health is slow. No permanent moral or mental defect is left. In the comatose type, in addition to the above, the limbs feel rigid, knee and elbow are flexed, and motor movements occur; reflexes are exaggerated, with occasionally slight head retraction and ankle clonus.

Thus, the symptoms vary considerably, and differential diagnosis becomes, in consequence, difficult at times, as between the case of poisoning and the following: Acute alcoholic poisoning, hasheesh poisoning, Bell's disease (acute delirious mania), delirium of fevers, apoplexy, opium poisoning, cerebrospinal fever, uræmia, etc. Pilocarpine is the antidote most useful in the large majority of cases, though contra-indicated in the small minority.

2. *Phenacetin.*

The symptoms are: giddiness, deep cyanosis, vomiting and collapse, with feeble respirations, sweating of skin, and low temperature. There is generally a long interval between the ingestion of the poison and the onset of symptoms, due to its slow absorption and breakdown. The urine as a rule gives a well-marked reaction for paramido-phenol. It should be noted that the administration of substances of the antipyrin and phenacetin group should be discontinued during the menstrual period in women, as at that time these drugs act more quickly upon the blood, and produce methæmoglobin.

3. *Tetrachloride of Ethane (Tetrachlorethane).*

The symptoms are: general malaise, drowsiness, loss of appetite, nasty taste at the back of the throat, nausea, morning retching, constipation and headache, followed by definite deep jaundice, pale stools and bilious urine, and finally mental confusion, stuporosity or delirium, coma and death. Hematemesis, purpuric rash, and suppression of urine may also occur. The onset of symptoms is insidious, and the susceptibility of persons to the poison various. The jaundice appears to be of the toxæmic type.

Tetrachloride of ethane poisoning has appeared recently amongst certain aeroplane and seaplane workers, and is due to the dope or cellulose varnish (a solution of acetate of cellulose in a mixture of benzene, acetone, methylated spirits, and tetrachlorethane), from which a heavy vapour of tetrachloride of ethane and of other volatile constituents is given off. Preventive measures suggest themselves at once, viz., the extraction of the heavy vapour by powerful fans from the neighbourhood of the workers.

IV. SCHOOL MEDICAL SERVICE.

THE GROWTH OF MEDICAL INSPECTION.

The medical inspection of school children is increasing by leaps and bounds, and officials are being added to officials—school medical officers, nurses, and clerks. The *average* time per child inspection appears from statistics to be about six minutes for the medical officer and eight minutes for the nurse—the latter officer preparing the child for examination and assisting in weighing, measuring, and vision-testing. The large majority of the defects found are of a trifling character, and the monotony and depressing nature of continuously examining normal children are beginning to have a bad effect upon the officials concerned. It is monotony that kills, and, unless something is done, some alteration made in *routine* school medical examinations, it is feared that there may be a tendency for the present high standard of work in connection with the medical inspection of school children to deteriorate, and such work to become purely perfunctory. The subject is one deserving the attention of the Board of Education and the various School Authorities throughout the country. It may be that the difficulty will be met by combining treatment with inspection, so that a school medical inspector may become interested in following up, by treatment, some of the cases that he or she may discover on inspection. It is possible to *over-specialize*.

NUTRITION OF THE SCHOOL CHILD.

The subject of nutrition is soon forced upon the attention of all officers engaged in the medical examination of school children, and defective nutrition is found to be the most important of all the physical defects met with. How best can this be remedied? What is its cause or causes? Is it due (directly or indirectly) to the following, amongst other, conditions: Heredity and the mother's antenatal state, poverty, bad housing, improper feeding, neglect, intemperance of parent or parents, etc.? Allowing, as all must, the important part played by heredity and the mother's antenatal state in connection with the nutrition of the newly-born infant, and admitting the truth of the well-known facts connected with infantile mortality and morbidity (due principally to improper feeding), there are left the following causes of defective nutrition met with in school children, viz., poverty, improper feeding, and bad housing. Scottish statistics are interesting in regard to housing, showing that the child living in the one-roomed house, whether boy or girl, is always, on the average, distinctly smaller and lighter than the child living in the two-roomed house, and so on, and that the poorer the child, the more it suffers in nutrition and growth. The actual figures are for boys and girls between 5 and 18 years:—

		TENEMENTS			
		One-roomed	Two-roomed	Three-roomed	Four-roomed
Average weights (in lb.)	Boys ..	52.6	56.1	60.6	64.3
	Girls ..	51.5	54.8	59.4	65.5
Average heights (in inches)	Boys ..	46.6	48.1	50.0	51.3
	Girls ..	46.3	47.8	49.6	51.6

Improper feeding may be summed up in the words—"not obtaining the *minimum* calories of energy required" (3500 for a moderate day's work for a man, and proportionately less for a woman or child). Statistics recently published in Scotland show that, in connection with the families examined, the *average* daily energy value of all the diets gave 3163 calories, the *average* composition of all the diets being 110 grams of protein, 83 grams of fat, and 473 grams of carbohydrate—the principal food-stuffs used being bread, potatoes, milk, sugar, beef, and vegetables with (strange to say) relatively small amounts of oatmeal, peas, beans, etc. Of the families whose weekly income was *over* 20/—, 28.5 per cent had a diet giving less than 3000 calories of energy, whilst, of the families whose weekly income was *below* 20/—, or irregular, 82.5 per cent had a diet giving less than 3000 calories of energy. In other words, families with a smaller income than 20/— per week, or with an irregular income, failed to get a supply of food for the proper development of the body or for the maintenance of the capacity for active work. The statistics are specially interesting, as the conclusions to be drawn therefrom are what were to be expected on common-sense lines. It is true that the figures only apply to Scottish children and Scottish families, but the same will doubtless be found true of all British children and British families when the statistics are collected and published.

INCOME TAX IN RELATION TO THE MEDICAL PROFESSION.

BY

ERNEST JEFFERIS,

Late Income Tax Department, Inland Revenue, Bath.

Income.—On the receipts or earning side of the account are to be included all sums earned in the practice, with no exception, as enumerated under *Assessment* below, together with the income derived from any other source whatever, such as house property, dividends, etc., whether payable to the practitioner or his wife.

Expenditure.—All expenses necessarily and actually incurred in professional work are claimable as deductions.

Assessment.—The tax is administered under various schedules, but 'D' and 'E' are those chiefly concerned. Schedule 'E' covers sums earned from appointments where the emolument is of a fixed character, and under which the recipient experiences little difficulty in making the income tax return. The full salary, fees, or other receipts without deduction must be first entered, followed by an account of the expenses absolutely and necessarily incurred in the fulfilment of such appointments.

Thus far provision is made for the certainty, so to speak; the uncertain or fluctuating income is assessed under Schedule 'D,' which after a little examination is simple enough, although the professional man is often perplexed in endeavouring to comply with its requirements. In a sense, a forecast has to be made in the spring of the year of the amount of the earnings likely to be made during the period expiring with the succeeding spring. At first sight the position appears curious; the actual income cannot of course be rendered, neither is it demanded; neither is it the income hoped to be secured, but an average of the actual result of the three preceding years, and it is sometimes called a Statutory income. Hence the paramount necessity of keeping accurate accounts, both of earnings and expenditure, without which the taxpayer is in a dilemma, and guessing necessarily takes the place of facts, with the consequence of overcharge sooner or later, which in these times, when the rate of duty is abnormally high, may be a serious matter. The failing to make a correct or any return is provided for by the tax machinery just as effectively as an accurate return, the Income Tax Commissioners being armed with the power of making estimates against such contingencies.

It is therefore essential that every practitioner should acquaint

himself with a simple form of account-keeping, which should necessarily be written up and prepared annually before he attempts to fill up the income-tax form. The period to which the accounts are made up is left to the taxpayer, who can choose whether his fiscal year shall expire on March 31 or Dec. 31 (the more common), or any other date. The return must, however, be on the result of the three years' average expiring before the 5th April, to which the accounts are usually made up. The rules in practice will be found to be quite elastic, and really lean in favour of the taxpayer.

Deductions for Expenses.—Where the practice is carried on in a surgery, or in consulting quarters entirely separate from the residence, the matter is simple—every expense there incurred is claimable. Where, however, a portion only of the residence is set apart for professional requirements, a share of such expenditure only may be charged against profit. The expenses should be analyzed under subheads as generally required by the tax department, thus :—

Rent.—Take two-thirds, unless it can be reasonably urged that such rent is not incurred solely on account of the practice. Then take say half—this question is generally best arranged with the local Surveyor of Taxes, and the basis then agreed upon should be always adhered to. Where the residence is owned, the amount chargeable would be, say, two-thirds of the sum assessed under Schedule 'A' (often styled 'Property Tax'), also rent paid for stables or motor garage.

Income Tax.—This must be excluded ; it is not an allowable deduction in any case.

Local Rates.—In the same proportion as rent.

Wages paid to coachman, chauffeur, and usually one domestic servant, and cost of liveries ; and also a reasonable estimate for the board of the domestic servant when the latter is employed for attendance on patients.

Forage for Horses, Repairs to Carriage, Harness, etc.

Motor Upkeep, Petrol and Repairs (or a proportion where used partly for private purposes).

Books, Instruments, Appliances, Drugs, and such like expenses.

Travelling.—All rail and cab fares necessarily incurred.

Heat, Light, and Water Rental.—A reasonable proportion of same.

Insurance.—Proportion *re* fire for premises and furniture, employers' liability, and national insurance for servants.

Telephone, Postage, Stationery, and Printing.

Sundries and Repairs, Painting, etc., incurred in the professional quarters.

The initial cost of surgical instruments, carriages or motors, are not allowable deductions, but all expenses incurred by way of substitution are claimable. For instance, if a carriage (having been used in the practice) is sold, and a new one purchased in lieu of it, the cost of the latter, less the amount realized by sale of the old one, would be claimable.

Interest on loans of capital employed, or annuities paid out of profit, or any other annual charges, are inadmissible deductions. The tax thereon must be included in the assessment, and the power of deduction thereof is permitted to the payer from the recipient. This arrangement facilitates necessary privacy, conforms to the rule of the tax being assessed upon income at its source, and also insures protection to the revenue.

As inferred above, income-tax matters have so commanded public attention that it is unnecessary to dwell upon the importance of claiming every incurred expense, and I would add that whenever an honest attempt is directed to render straightforward accounts, the Commissioners will generally fix up a fair and satisfactory assessment through the Surveyor of Taxes. Complaints are often preferred against the authorities, but when carefully inquired into they can generally be traced either to disregard of the regulations, or carelessness in account-keeping. The taxpayer can elect to be assessed by the Special Commissioners in London, for privacy, if he so desires; but it will be found by experience that without accurate accounts the additional trouble will in all probability encourage him to prefer assessment by the local Commissioners, where personal explanation is available; here then is also a further inducement to keep accurate accounts.

On examination it must be conceded that the present system is difficult to improve upon. The Chancellor of the Exchequer is called upon to provide for the expenditure of the nation by the best available estimates, generally in the spring of the year, while the individual has to follow—but in his case with clear instructions and rules to assist him.

Ample provision is made to meet the various contingencies arising through income derived during only short periods: the first year's assessment is based upon its own result, the second year again on that same result, and the third year on the average of the first and second years, and following years upon the usual three years' average.

All changes, of whatever character, are dealt with on their merits, and all that is necessary is to acquaint the local Tax Department with the details.

Every person called upon to do so must render a return, under penalty for neglect; indeed, the incidence of the assessment rather favours the person who makes a return than otherwise. The easiest, and the only safe course is therefore to take the return form, complete the professional earnings and also any other income from untaxed sources as directed on the form, then follow on the next page with particulars of income from private sources, such as house property, dividends on shares, etc. Until this has been completed a claim to the lower rate assessable upon the earned income cannot be conceded—nor yet any abatement which may ultimately be claimable upon the total income shown. It must be remembered that page 3 of the Schedule 'D' return form must contain—in addition to the

professional income—all sources of income whatsoever, including the wife's if any—whether the income is taxed or not. The object of this is not to tax the income twice, as many imagine, but the reverse, namely, to show under which division the total income falls, and whether total exemption, abatement, or other relief is to be allowed when making the assessment. If abatement, life insurance premiums or claim for children become due in respect of income which has suffered tax, the position is met by the taxpayer preferring a claim for repayment at the end of the financial year, by which the necessary adjustment is effected: a repayment claim may be preferred for a period of three years to the preceding April 5. The various spaces to be filled in for separate claims such as life insurance premiums, and allowances for children, are simple, and cannot well be mistaken.

After the professional earnings element of the return has been mastered, the remainder is more or less of a personal character, and each case stands, of course, on its own merits.

It may be observed that the official forms are printed and provided to include every kind of income, but it is unnecessary to study the items which are inapplicable to the personal position.

Super-tax.—This applies only to incomes which exceed £3000 from whatever source derived, and is assessed by the Special Commissioners in London. The basis of returns for super-tax for income derived from trades and professions is upon the amount as assessed under Schedule 'D,' together with the income derived from investments, for the previous year ended April 5, and upon the same basis as estimated for the purpose of exemption or abatements in ordinary, but subject also to further deductions.

All persons required by the Special Commissioners to make a return must do so under penalty, whether liable or not to super-tax, and every person chargeable with super-tax is under the obligation to give notice of such fact to the Special Commissioners before September 30, in any year.

The receipt or non-receipt of the return form does not relieve the liability to make a return; moreover, all persons are now liable to assessment for three years during which the tax or any portion of it which may have been unpaid or evaded; the aggregate duty which is thus assessable and may be demanded may assume a heavy call upon the resources under the present abnormal conditions. Generally speaking, although the working of the tax is credited with difficulty, there is probably no case extant which is not provided for, and it may be added that the responsibility rests entirely upon the taxpayer if, by his neglect of proper application at the right time and to the proper authority, he retains any real grievance in regard to the amount of tax demanded of him.

No doubt, on the other hand, many persons may be entitled to deductions which are not asked for by them, and perhaps it may be well in some cases to obtain professional advice and assistance, at all events in the first instance.

The following sample account is given as a guide to how such statements may be prepared :—

SAMPLE OF A PROFESSIONAL REVENUE ACCOUNT FOR THE YEAR ENDED
31ST DEC., 1915, IN A CASE WHERE THE PREMISES ARE USED
PARTLY FOR PRIVATE PURPOSES.

1915.	Expenses Claimed.	£	s.	d.	1915.	Receipts.	£	s.	d.
Dec. 31.					Dec. 31.				
	Salary of Assistant, say	300	0	0		Patients' Fees	1250	0	0
	Rent (<i>paid</i> £100)	66	13	4		Salary as M.O.	200	0	0
	Local Rates (<i>paid</i> £33 6s. 8d.)	22	4	6		Literary Fees	50	0	0
	Wages and Liveries	110	0	0		Income from all			
	Domestic Servant engaged for wait- ing on Patients	£20				private sources			
	Board, ditto	£40				on which tax is			
			60	0	0	deducted before			
	Horse Keep, Repairs to Carriages, Harness, etc.	100	0	0		payment,			
	Motor Upkeep, Petrol and Repairs	100	0	0		£700 0s. 0d.			
	Books, Instruments, Appliances and Drugs	25	0	0					
	Travelling, Rail and Cab, etc. Fares	10	0	0					
	Heat, Light and Water (<i>paid</i> £30)...	20	0	0					
	Insurance—								
	Fire (<i>paid</i> £5)	1	13	4					
	Nat. Insurance Stamps (<i>paid</i> £3 13s. 0d.)	2	7	10					
	Employers' Liability (<i>paid</i> £5)	2	10	0					
	Telephone, Postage, Stationery and Printing	10	0	0					
	Sundries, including Repairs, Paint- ing, etc. (<i>paid</i> £15)	10	0	0					
	*Wear and Tear of Carriages, Motor and Surgical Instruments	0	0	0					
		840	9	0					
	Taxable Balance	659	11	0					
		£1500	0	0			£1500	0	0

* Wear and tear restricted to traders; if claimed, communication thereon should be made to the Tax Department.

THE EDITOR'S TABLE.

Samples (not returnable) and particulars for this section should be sent to The Editor, "Medical Annual" Offices, Stonebridge, Bristol, on or before November 15th.

We are anxious to express no opinion except as a result of practical knowledge, and it is owing to this fact that a notice in the MEDICAL ANNUAL has come to be valued.

NEW MEDICAL INSTRUMENTS AND APPLIANCES.

We give Inventors and Manufacturers the opportunity of bringing their work before our readers entirely free of cost to themselves, subject only to the following conditions:—

(1) Each article sent for notice must have the novelty or improvement claimed for it clearly stated upon a SEPARATE sheet or sheets of paper. This should have attached to it any illustration (WHICH MUST BE SMALL) for which insertion is desired, and also bear the maker's name. The attention of firms who send a large number of articles for notice is particularly directed to the above condition, as each article has to be sorted into its proper department before it can be considered.

(2) Medical Inventors should merely describe the instrument or appliance, and avoid giving technique of operations.

The Editor is not able to accept reference to circulars, catalogues, or literature as a compliance with these conditions.

NEW PHARMACEUTICAL PRODUCTS AND DIETETIC ARTICLES.

We are always ready, when a sufficient quantity is sent to us EARLY IN THE YEAR, to arrange for these to be tested in hospital practice and reported upon; under other circumstances our knowledge is necessarily more limited; but frequently the simple information as to where a particular preparation can be obtained is all the practitioner requires.

INTRODUCTORY NOTE.

THE year of war has left our surgical manufacturers very little time for new inventions, and some useful products are not procurable from lack of skilled labour to produce them. But the war has caused a revolution in surgical methods which is beginning to involve changes in the accessories.

Sterilization of instruments is not always possible under war conditions, nor is it necessary if they are kept in "Brytstele" solution. Surgeons who have adopted this method will not readily go back to the older way.

It has become no longer a matter of interest whether a dressing is charged with this or another antiseptic. Its absorbent properties are more important. Modern research shows that in the lymph we have the most powerful antiseptic. By the osmotic effects of saline solutions, the flow of lymph to the wound has been promoted with the best results.

We shall look in the future not only to the absorbent properties of the dressings we use for wounds, but also to their osmotic action. We are personally interested in researches which are being made on these lines.

An osmotic dressing has been made by compressing cellulose to form a thick lint, and saturating it with boro-cresol, a highly hygroscopic solution, to which are added citrate of soda and calcium chloride. This has at least ten times the absorbent powers of lint or gauze. When applied to a blister after the contents are removed, it first draws out more lymph than was in the original blister, and then completely heals it in forty-eight hours. This proves that the lymph has healing as well as antiseptic properties.

No better demonstration could be given of the value of the researches carried out by Colonel Sir Almroth Wright.

The same dressing has been manufactured in the form of tubes for drainage purposes. These are highly hygroscopic, and cause an abundant flow of lymph from the wound. In cases of infective wounds it is possible to wash out the wound with its own lymph.

Messrs. A. E. Braid & Co. Ltd., of 30, Gower Place, Gower Street, W.C., will supply samples to surgeons who wish to investigate. Our own experiments have been highly satisfactory.

Other advances in the appliances for surgical treatment are the Mackenzie-Davidson bullet detector and a modification called the 'Telephone' bullet detector, and Messrs. Mayer & Meltzer's improvement upon the 'Emandem' artificial leg.

MEDICAL AND SURGICAL APPLIANCES.

Abdominal Support.—The best form of support to be worn after the operation for appendicitis is always a difficult question. Messrs. Salmon Ody Ltd., 7, New Oxford Street, W.C., propose that it should take the form of a truss with a flat piece of vulcanite held by a flexible spring over the site of the wound, and a circular pad at the back. The arrangement will be easily understood from the illustration (*Fig. 65*). The idea strongly commends itself to us, as the support is entirely localized, and there is no belt to cause heat and pressure on the parts where it is not required; and also because it is made in a manner which enables it to adapt itself to every movement of the body. We can recommend this appliance.

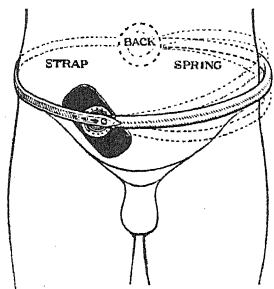


Fig. 65.

Bone-graft Calipers.—These are intended to measure the extent of the bed the proposed graft is to occupy. Designed by Mr. Harry Platt, M.S., and made by Messrs. Mayer & Meltzer, 71, Great Portland Street, W.

Boric Skin.—We mentioned this in a previous issue, but following the war, difficulties occurred in its manufacture. It is a transparent tissue, adherent on either side to the moistened skin, and is almost invisible. It is not removed by washing, but when soap is used it is well to rub a little vaseline over the dressing to preserve it. It is put up in little packets with some absorbent tissue to check bleeding. Its value for razor cuts and skin-wounds is obvious. Packets are sixpence each. A. E. Braid & Co. Ltd., 30, Gower Place, Gower Street, W.C.

Brace and Screw-driver.—We illustrate here (*Fig. 66*) a modified brace and screw-driver designed by W. Sampson Handley, M.S., F.R.C.S., and manufactured by Messrs. Mayer & Meltzer, 71, Great Portland Street, W.

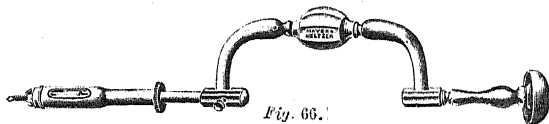


Fig. 66.

Bullet Probe (The Telephone).—A very ingenious method of locating a bullet or a piece of shrapnel imbedded in the tissues or bone is illustrated here (*Fig. 67*). The telephone receiver is placed on the head of the operator, and two thick conical terminals plugged into the battery; the remaining two thin terminals are connected to the zinc plate and probe by means of the binding screws. The pad covering the zinc plate should be well moistened with a saturated saline solution, and placed on the patient's body in direct contact with the skin. The probe is now introduced into the flesh of the patient, and immediately a metallic foreign body is touched, the sound is conducted to the receiver, thus giving the exact position of the metal fragment. This apparatus has been in use at St. Thomas's Hospital for some considerable time, and has been of the greatest possible service. The whole apparatus is packed in a neat leather case, and costs 35/- complete. The Holborn Surgical Instrument Co. Ltd., 26, Thavies Inn, E.C.

The *Mackenzie-Davidson Telephone Bullet Detector* (Fig. 68) differs from the above in the fact that it requires no battery. It is based upon the principle that all metals are electro-negative to platinum and carbon. When one of these is used, the human body forms the electrolyte. A platinum plate is placed in firm contact with the skin, this represents the positive element. The negative is then represented by the nickel bullet embedded in the tissue. If the circuit is completed by passing a needle so as to come into contact with the bullet, a very striking rattling sound is at once produced in the telephone.

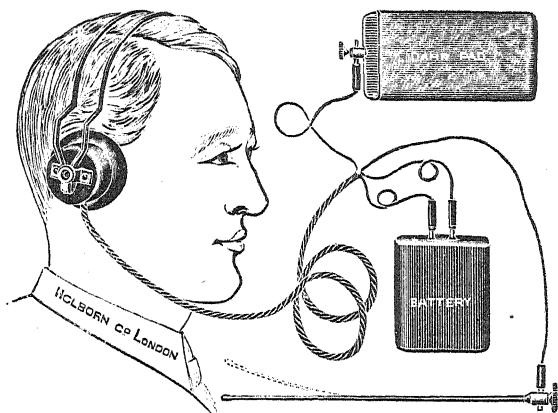


Fig. 67.

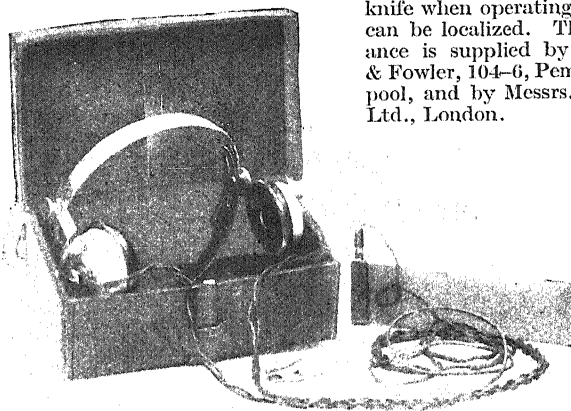


Fig. 68.

The telephone can be attached to the knife when operating, so that the bullet can be localized. This ingenious appliance is supplied by Messrs. Alexander & Fowler, 104-6, Pembroke Place, Liverpool, and by Messrs. Allen & Hanburys Ltd., London.

Drainage Tubes.

—We have mentioned the new osmotic drainage tube in our introductory note. Being hygroscopic it produces a secretion of lymph. This is absorbed by the tube, which provides a free outlet for its discharge. It also acts as an in-

ternal antiseptic and healing dressing to the whole surface of the wound. The superiority of these tubes over 'rubber' or plugging gauze is obvious. A. E. Braid & Co. Ltd., 30, Gower Place, Gower Street, W.C.

For *Brain Surgery* an aluminium tube (Fig. 69) has been designed by Mr. Percy Sargent, F.R.C.S., and is manufactured by Messrs. Allen & Hanburys Ltd. This is also a great improvement on rubber tubing.

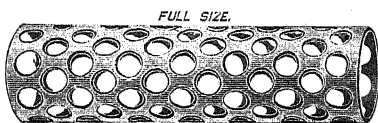


Fig. 69.

Ear Drum Protectors.—The Holborn Surgical Instrument Co. Ltd., 26, Thavies Inn, E.C., send us samples of their ear drum protectors (*Fig. 70*). These are invaluable to naval and military men exposed to heavy gun-fire, and are also a protection when motoring or flying in a strong wind. They cost 9d. per pair, and are most efficient.

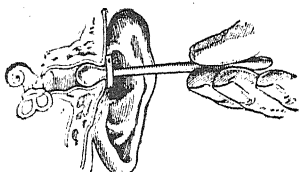


Fig. 70.

and of elastic material which contains no rubber. We like it better than any of the bandages of this kind which have come under our notice, and think it will prove more comfortable and durable. Its elasticity is not destroyed by washing. We have adopted it for general use. It is called the 'Liverpool Skin Hospital Bandage,' and costs 2/- (*Fig. 71*). Supplied by Messrs. Alexander & Fowler, 104-6, Pembroke Place, Liverpool.

Elastic Bandage.—This is intended for varicose veins. It is very soft, of firm texture and porous,

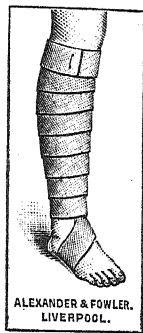


Fig. 71.

Electric Batteries.—Messrs. Allen & Hanburys introduce a constant current dry-cell battery, containing twenty-four cells with milliamperemeter, reverser, pole shunt, electrodes, etc. It is claimed as an advantage that when the first twelve cells have been exhausted, the remaining twelve may be brought into use. If fitted with a current selector, any particular cells could be brought into use as required, which we regard as the only satisfactory arrangement in large constant current batteries. The life of the battery and its efficiency depends upon employing all the cells in rotation, not in using them up a dozen at a time. Cost £8 5s.

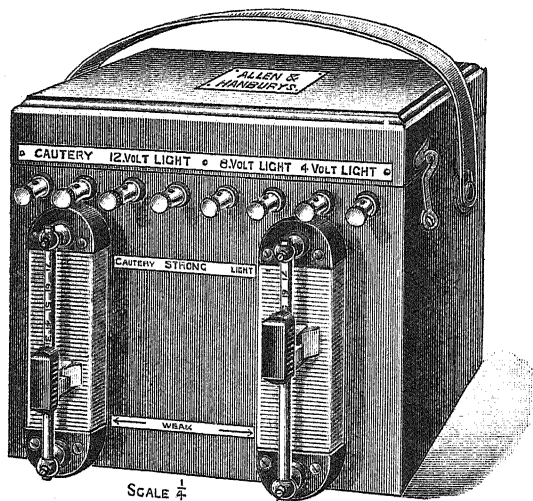


Fig. 72.

The same firm have a very convenient battery (*Fig. 72*) for combined use of electric light and cautery, the former 8 volts and the latter 4.

Glass Safety Valve
(The 'Hygienic'). —



Fig. 73.

duced a tube (*Fig. 73*) so designed that if introduced into the circuit of an irrigator it will trap any foreign particle. It is easily cleaned and quite efficient. It can be sterilized by boiling. The cost is 2/6.

Messrs. C. J. Hewlett & Son Ltd., Charlotte Street, E.C., have pro-

Hypodermic Syringes.—We are glad to find that British manufacturers are giving their attention to the manufacture of hypodermic and serum syringes.

Under the name of the 'Tourniquet Brand,' a firm, who only supply their syringes through the trade, have produced three excellent syringes which compare favourably, both as regards price and manufacture, with the foreign article.

The best of these is a 'Record' serum syringe, which is supplied in 5 c.c., 10 c.c., and 20 c.c. sizes. It has a glass graduated barrel and metal plunger, and is easily taken apart for sterilizing. It is also fitted with a sufficiently long needle.

We wish we could induce our medical friends to use nothing smaller than a 5 c.c. syringe for hypodermic injection, and then never give it hypodermically, but introduce it deeply into the muscle. This method makes it painless and safe. The concentrated solutions of the B.P. given with the little 20-minim syringe are painful and risky. The proper strength of a hypodermic solution is half a grain to a drachm. This is practically isotonic with the blood, and avoids pain. An error of one or two minims becomes of no consequence. If this rule were adopted in hospitals, and all 'hypodermic' solutions made to the strength of four grains to the ounce, a distinct advance would be made.

The 'Tourniquet Brand' also produce the small glass syringes 20 min., 1 c.c., 40 min., and 2 c.c. They have one pattern in which an all-glass syringe has a glass stopper to form the nozzle, so that if broken or injured it can be easily replaced. Any firm of surgical instrument makers will supply these syringes on request, and we can strongly recommend them.

Irrigation, Staging to Facilitate.—With a view to making continuous irrigation of a wound practicable, Mr. E. H. Willock has designed a staging which can only be properly utilized if the mattress is so shaped and arranged as to co-operate with the staging (*Fig. 74*). The military mattress in its three sections can be readily adapted to any necessary position. In order to obtain sufficient space underneath the staging, it may be necessary to place one mattress on the top of the other.

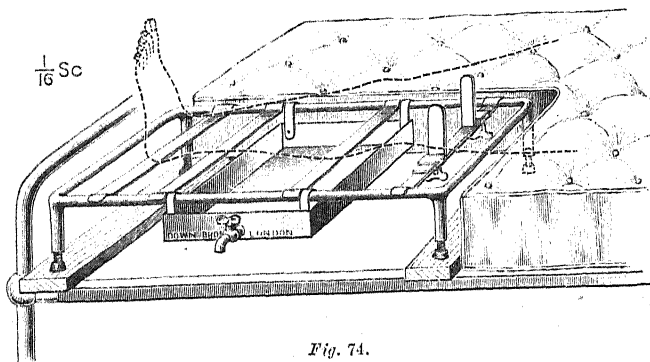


Fig. 74.

The staging consists of an oblong frame resting on four telescopic legs. Movable transverse bars, 2in. wide, support the part of the body that needs irrigating or draining. For supporting the buttocks, special bars are made. These transverse bars are provided with vertical detachable splint bars for the purpose of fixing a limb if necessary. Only one set of splint bars is shown in the sketch. Extension can be applied from the end of the frame. Messrs. Down Bros. Ltd., London, are the manufacturers.

Laminectomy Forceps (Sargent's).—These are a modified form of the prismatic forceps used by Sir Victor Horsley in skull operations. They are made by Messrs. Allen & Hanburys Ltd., London. (*Fig. 75.*)

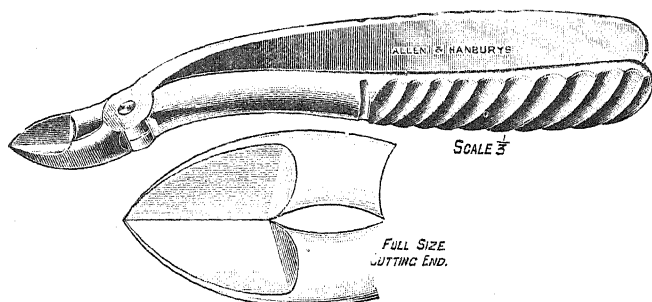


Fig. 75.

Leg (Artificial).—The improvement of the 'Emandem' leg for amputation above the knee is due to the form and arrangement of the tendons. The bending of the knee-joint automatically raises the toe from the ground, thus enabling the wearer to walk with ease over uneven ground, on and off the pavement, up hill, etc. This movement is attained by means of tendons and springs situate in front of, and behind the ankle-joint; when the knee is bent, the tension on the back tendon A is released, causing the spring B to come into play, and raising the toe from the ground. The rubber accumulator (not shown in the illustration, *Fig. 76*) throws the leg forward, bringing it back to the straight. There is a door on either side to enable the springs to be adjusted or repaired. It is designed to withstand rough usage. Messrs. Mayer & Meltzer are the manufacturers.

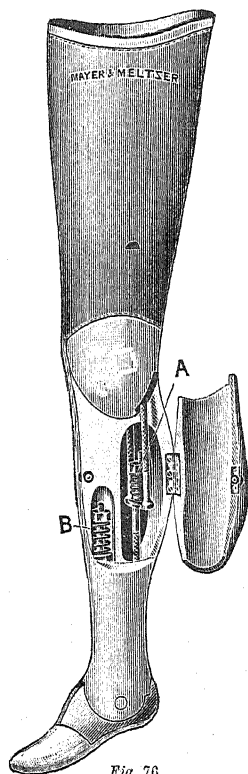


Fig. 76.

Motor Cars, Mechanical Self-starter for.—We can recommend the Sandbo self-starter to those of our readers who drive 'Ford' cars. It means that instead of getting down in all weathers to start the car, it can be done by a sharp pull on a handle and cord from the driver's seat. We have had one in use for some months during bad weather, and it has proved a great convenience and very efficient. It costs about £5, and the fitting to the car about 10/-. We should be sorry to be without this appliance. The Sandbo Starter Co., 182, Euston Road, N.W.

Operating Tables.—Messrs. Allen & Hanburys have made a pedestal operating table (*Fig. 77*) for St. Bartholomew's Hospital. It is raised or lowered by means of an oil pump, which works through a pedal. The table is fitted with every arrangement for securing the proper position of

the body for all surgical operations, and has given great satisfaction. It costs £78.

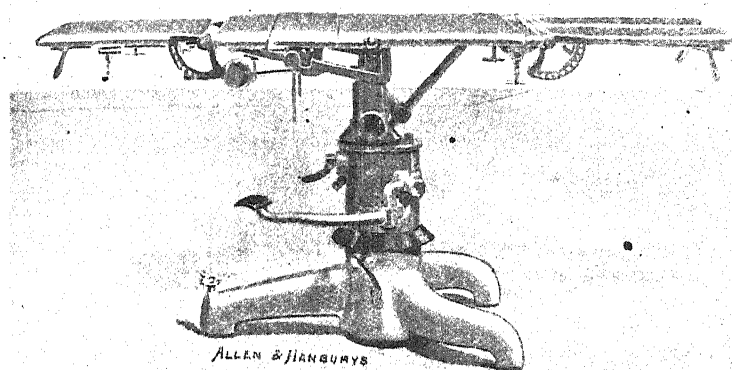


Fig. 77

The Holborn Surgical Instrument Co. Ltd. also make a pedestal operation table (*Fig. 78*) which is elevated or depressed by an oil pump operated by a

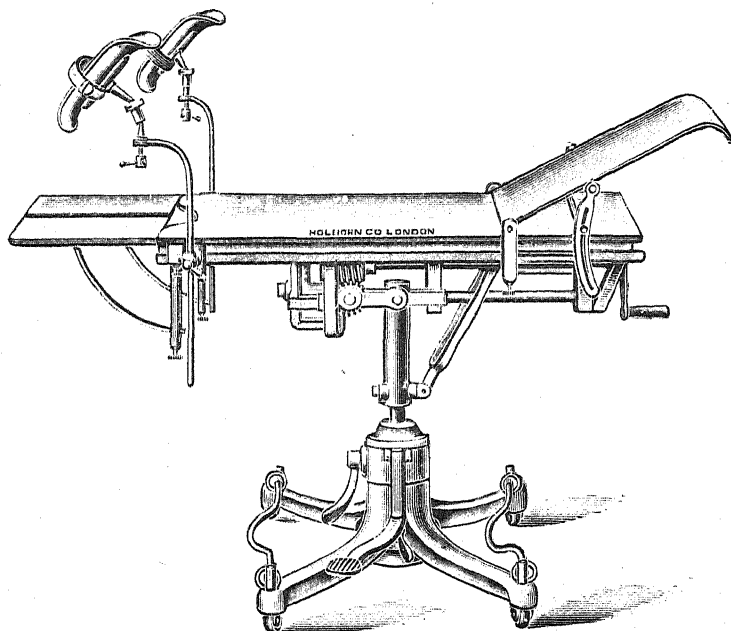


Fig. 78.

foot lever. It has also many other improvements. Without the leg crutches and fixing screws it costs £36 5s. 6d., or £42 2s. 6d. complete.

Operation Cap and Mask Combined.—The accompanying illustrations (*Figs. 79 and 80*) represent a form of combined cap and mask suggested by Major E. J. O'Meara, I.M.S. It will be found exceedingly convenient in practice, as it is made in one piece and is adjusted in the following manner. After putting the cap on the head, the long tail-piece is passed across the face



Fig. 79.

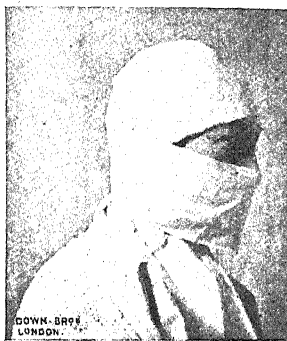


Fig. 80.

and fastened by buttons behind. The advantages claimed are: that it is more comfortable, there being no dragging on the ears; it is fastened by buttons and therefore more easily secured; and there is a slit behind which ensures the cap fitting accurately when the mask is pulled across the face. The makers are Messrs. Down Bros. Ltd., St. Thomas's Street, S.E.

Osmique Dressing.—This dressing has an osmotic action upon wounds by which the lymph is drawn to the surface, and it is apparently this lymph which accounts for its remarkable healing properties. We have been testing it for some months. If a piece is applied dry to a blister after the contents are evacuated, the skin will be healed within forty-eight hours and a large amount of serum abstracted.

The same applies to skin wounds. Only one dressing is required, and if in forty-eight hours the dressing is adherent to the wound, it is allowed to remain until it drops off, when the wound is healed. For inflammatory conditions, boils, carbuncles, etc., it is applied moist, and will retain its moisture for twenty-four hours, if covered with protective. Applied in the same way to chronic ulcers it gives remarkable effects, and we have quite discarded ointments. It has fully ten times the absorbent properties of lint or gauze. It is made of compressed cellulose treated with cresol boroid. The latter is highly hygroscopic, and is said to be the only solution of cresol in which soap or potash is not used as a solvent. It contains about 40 per cent of borax.

We believe this dressing and the drainage tubes made from the same material represent a great advance in surgical methods. A. E. Braid & Co. Ltd., 30, Gower Place, Gower Street, W.C.

Saline Solution Apparatus.—This apparatus is designed to secure the even pressure with which the solution must be introduced, in order to remove the difficulty occasioned by flatus from the intestine, and also to secure a uniform and sufficient heat. It is the design of Mr. C. Hamilton Whiteford, and has been carried out by Messrs. Reynolds & Branson Ltd., of Leeds, in their accustomed practical manner. The illustration (*Fig. 81*) shows the apparatus in section.

Essentially it consists of a vessel heated by a night-light, in which the jar containing the saline stands on a platform. The water is drawn from the

'ditch' round the platform, and the water in this ditch is kept at a uniform level by a siphon connected with the saline bottle. There is a thermometer which enables the heat of the fluid to be observed. The taps, tubes, and fittings are all strongly made and well finished. It is an entirely practical apparatus.

Silgut Suture.—This has all the appearance of silkworm gut, having been manufactured expressly for the sewing of wounds. It is remarkably smooth and of great tensile strength, is much cheaper than silkworm gut, and nicer to handle. We regard it as a distinct improvement. Messrs. A. E. Braid & Co. Ltd., 30, Gower Place, Gower Street, London, W.C.

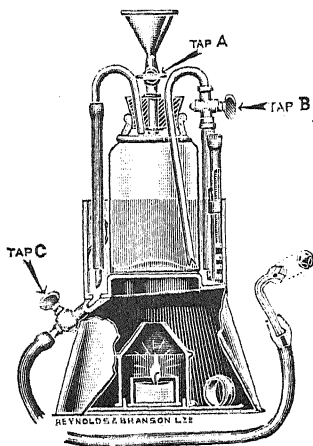


Fig. 81.

Splints.—*The Wallace-Maybury Extensor Leg Splint (Fig. 82)* is designed by Mr. Cuthbert Wallace and Mr. B. C. Maybury, and is made by Messrs. Allen & Hanbury's Ltd., London.

This is a modification of Thomas's 'Caliper' splint. The foot-piece is provided with a traction screw, so that extension can be carried out to any extent required. This is valuable during the process of plating fractures of the femur and tibia, and also for the treatment of compound fractures. This splint is useful and practical while the patient is in bed.

Many years ago we designed a somewhat similar modification of Thomas's caliper by which extension could be maintained while the patient is ambulatory. It consisted of two steel tubes attached to the ring for three-quarters the length of the splint. Into these tubes two steel rods cut to make a screw were inserted. By screwing these rods into the tube or out of it the length of the caliper could be altered at will. This has proved very useful in contracted and painful knee-joint, as it enables the patient to walk with crutches on the sound limb while extension is being carried out on the affected limb, which swings clear of the ground. We mention this because it may prove useful for subsequent treatment of cases in which this extension splint is used.

Portable Splints.—Mr. F. Thompson, M.R.C.S., has designed a series of splints, which consist of flat metal plates, some of them with angle-pieces, and furnished with holes. By screwing these together with small nuts which are provided, a number of different splints can be made and adapted to every form of fracture. Their advantage is their extreme portability. The disadvantage is that flat splints at right angles do not always commend themselves. The price complete with padding, buckles, and triangular bandage is only 21/-. The Holborn Surgical Instrument Co. Ltd.

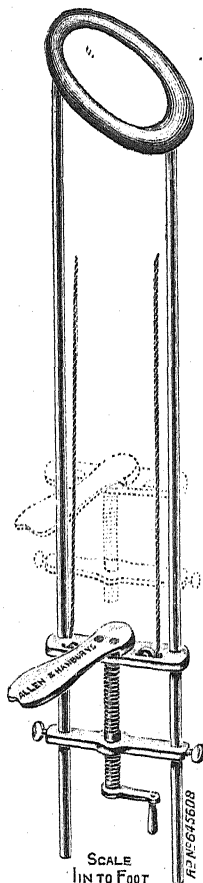


Fig. 82.

Back Leg Splint (Campling's).—This is an improvement on the ordinary Bryant's splint, as the foot-piece is hinged to it. It can be let down for dressing or inspection of the foot and the heel. The mechanism will be easily understood from the illustration (*Fig. 83*). It is made by Messrs. Mayer & Meltzer, 71, Great Portland Street, W.

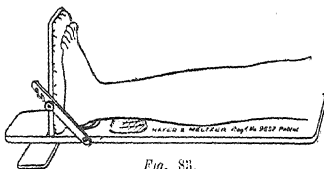


Fig. 83.

Sterilizer (for Gloves).—We illustrate here a simple form of sterilizer for gloves, designed by Mr. David M. Greig, F.R.C.S. Its construction will be readily understood (*Fig. 84*). Messrs. Down Bros. Ltd., St. Thomas Street, S.E., are the manufacturers.

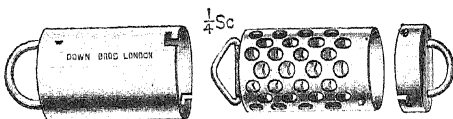


Fig. 84.

Surgical Needles.—Messrs. Allen & Hanburys send us samples of the needles designed by Mr. Percival P. Cole. These are sharp at both ends, and have the eye in the centre (*Fig. 85*). This is found greatly to facilitate the suturing of wounds. They have many advantages over the ordinary needle.

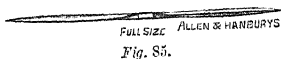


Fig. 85.

Surgical Spray (Rogers').—Mr. Frank A. Rogers, 327, Oxford Street, W. has produced a simple spray for surgical use (*Fig. 86*). Its merit is that there is nothing about it likely to break or perish. It enables the antiseptic solution to be applied in the form of a spray instead of being poured into the wound or applied by means of sponges or swabs. The result is not only more rapid and efficient, but also more economical. The surgeon can pass from one patient to another without any fear of conveying infection. It has been much used in the naval and military hospitals, and has been greatly appreciated. The cost is 4/6.

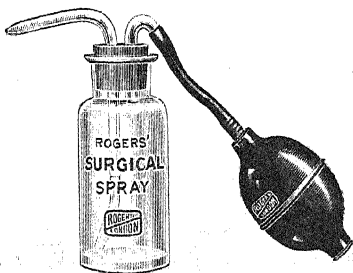


Fig. 86.

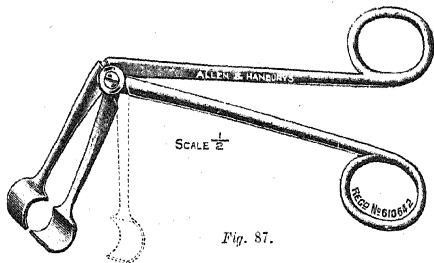


Fig. 87.

Syringe Forceps (Dally's).—These forceps (*Fig. 87*) are convenient for

lifting a hypodermic syringe from the sterilizer. Messrs. Allen & Hanburys Ltd., London.

Tonsil Guillotine.—This is designed by Mr. Chas. Heath, F.R.C.S., with the blade above the sheath instead of below (*Fig. 88*). It is said to be an efficient instrument for the enucleation of the tonsils. It is made by Messrs. Meyer & Meltzer, 71, Great Portland Street, W.

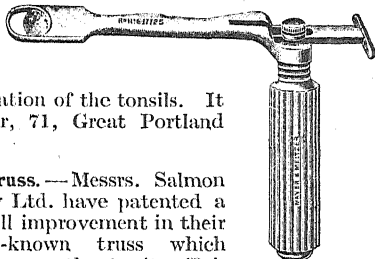


Fig. 88.

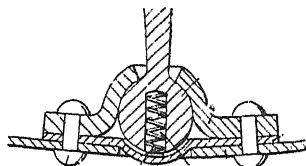


Fig. 89.

Truss.—Messrs. Salmon Ody Ltd. have patented a small improvement in their well-known truss which adds greatly to its efficiency. It consists of a spring, secreted within the ball of the joint of the pad (*Fig. 89*). This presses the ball against the socket and prevents it working loosely, so that the pad will remain steadily

at the point to which it is adjusted. This is a very distinct improvement.

Urethral Syringe.—We illustrate here (*Fig. 90*) Mr. Canny Ryall's urethral syringe with double-channel urethral nozzle. Also a useful vaginal tube. These are valuable both in the treatment and diagnosis of gonorrhœa.

Messrs. Allen & Hanburys also supply the same appliance in the form which permits it being attached to an ordinary irrigating apparatus, without the rubber ball.

Uterine Drainage.—Mr. Norman Porritt, of Bettws-y-Coed, recommends an extra large Budin's uterine catheter with specially large orifices at the tip, for use in puerperal sepsis. It is used to explore the uterus for retained secundines and to remove retained secretions and decidua. It is passed into the uterus, and a syringe attached to the end creates a vacuum in the tube and the uterine contents are sucked into the catheter. No air travels alongside the catheter into the uterus. Any

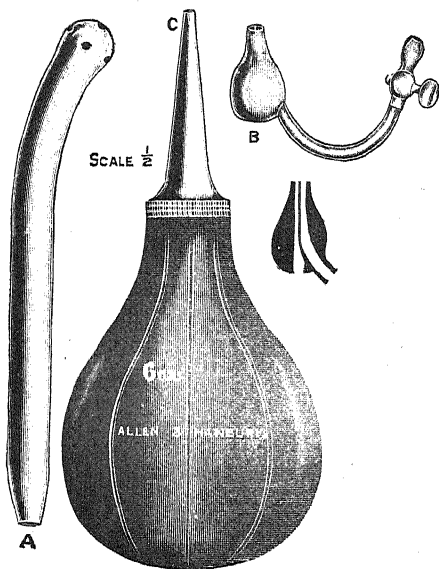


Fig. 90.

syringe may be used to exhaust the air. Mr. Porritt uses an ordinary Higginson's enema syringe in the following manner: The valve is first removed from the inlet end, and it is then attached to the uterine catheter or searcher; the air is driven out by compressing the bulb, and is prevented from passing up the searcher and into the uterus by compressing the tube behind the bulb; a vacuum is then created in the syringe by which suction is exerted within the uterus. With this appliance the uterus can be thoroughly searched and

its contents removed, thus obviating the need and dangers of digital exploration and uterine douching. If desired, however, the uterine searcher can be used to douche the uterus.

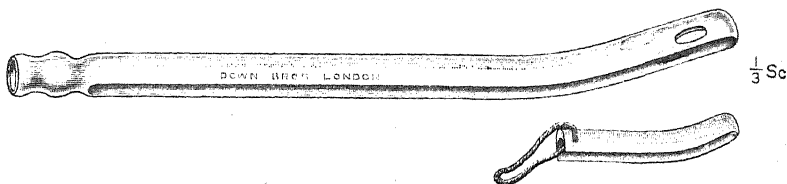


Fig. 91.

Mr. Porritt has also invented an '*Intra-uterine Drain*.' This is a solid celluloid cylinder, 3 ins. long, grooved along its length on one side, for introduction into the uterus when, in cases of puerperal sepsis, drainage is deficient. Held in a pair of uterine or other long forceps it is readily passed within the cervical canal, where its end projects into the fundus. A leash of thread left hanging in the vagina enables the drain to be withdrawn daily for cleansing and sterilization. The drain is retained in the uterus by a plug of gauze placed in the vagina. Messrs. Down Bros. are the makers.

Wooden Applicators.—For nasal and aural work the wooden applicator as a wool-carrier is preferred. It can be discarded after use and saves much trouble. Mr. C. G. Russ Wood, F.R.C.S.,

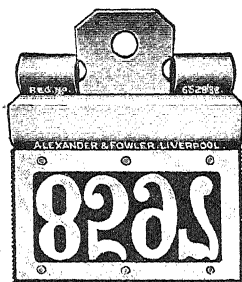


Fig. 93.

has designed a holder (Fig. 92) for these probes. We have had no opportunity of testing it, but expect it is efficient. It is made by Messrs. Mayer & Meltzer.

X-ray Negatives (Numbering).—We illustrate an ingenious device designed by Dr. Thurstan Holland (Fig. 93) for numbering x-ray negatives. It is clipped on to the negative with the proper number inserted, and this is printed on the negative by the exposure. It is produced by Messrs. Alexander & Fowler, 104-6, Pembroke Place, Liverpool.

Fig. 92.

PROGRESS OF PHARMACY, DIETETICS, &c.

Allenburys' Concentrated Food Products.—As usual, Messrs. Allen & Hanburys Ltd. are well to the fore in meeting the demands of the time with reliable products. The **Diet Tablets** consist of Allenburys' Diet with chocolate. The flavour is pleasant, and it may well be claimed for them that they are invaluable as a means of allaying thirst and staving off exhaustion from hunger. A similar product is the **Nutrient Lozenge**, "a combination of pure, rich milk, whole wheat, and the soluble extractives of prime lean beef." These lozenges are very palatable, and like the diet tablets are packed in tins suitable for the pocket. They are thus of value for "soldiers, sailors, aviators, motorists, travellers, etc." The lozenges are 1/- per tin of 24, the tablets 1/- per tin of 36. The **Meat Soup Squares** are designed for similar circumstances. Each tin (price 1/9) contains twelve squares, and each square makes a breakfast cup of excellent soup.

Alopon.—In providing the profession with this preparation Messrs. Allen & Hanburys have added yet one more to their already long list of signal services. It consists of all the alkaloids of opium in hydrochloride form, and is therefore the British equivalent of the German product pantopon (sold in this country as omnopon), which we have already commended to our readers as a most valuable opium preparation. In cardiac disease it is of marked value, and is usefully employed as a sedative preliminary to inhalation anaesthesia, in conjunction with scopolamine.

Amebetine dentifrice has been prepared by Messrs. Allen & Hanburys to render feasible the application of emetine to the local treatment of pyorrhœa alveolaris. This disease is ascribed by some investigators to the action of an amœba, and the natural sequence is to apply emetine to the extermination of this organism, since it has proved so valuable in the destruction of intestinal amœbæ. The dentifrice is pleasantly coloured, though perhaps a little over-scented.

Amyl Nitrite Ampoules (Parke, Davis & Co.).—These ampoules present the drug in the convenient and portable form usually employed for emergencies. They are supplied in three capacities, viz., 2, 3, or 5 minims. The glass ampoule is readily fractured, and the escaping contents saturate the enveloping material, from which the vapour may be inhaled.

Anti-vermin Emulsion.—This is a preventive against lice, fleas, mosquitoes, etc. It is put up in collapsible tubes, and can be rubbed into the skin like a soap or applied to the stockings, boots, etc. It is claimed to have proved most effective. The Holborn Surgical Instrument Co. Ltd., 26, Thavies Inn, E.C.

Aquaperia.—It is with something of a shock of surprise that one finds this already popular British natural aperient water is of recent origin. It is derived from a spring on the Harrogate Estate of Camwal Ltd., where it is bottled and standardized so that the dose does not vary. In purity, constancy of composition, and effectiveness of action, it compares favourably with any of the corresponding Hungarian and German waters, which it is destined to replace. The quart bottle costs only 11d., and on all counts it is much to be hoped that it will win a wide clientèle.

Argentide Vaginal Suppositories (Parke, Davis & Co.).—These vaginal suppositories (or pessaries) contain 5 per cent of argentide, which is a concentrated solution of silver iodide, a salt which possesses a powerful bactericidal action, does not irritate the mucosa, does not stain, and is useful in the treatment of both simple and specific vaginitis. Each suppository is enclosed in a sheath of pure tin, which protects it from bacterial or other contamination, and is readily removed at the time of use by clipping off the flanges with a pair of scissors and pulling apart the flaps which are thus left. The insertion of one of these suppositories is an excellent means of guarding against infection after the use of instruments in the vagina. They are supplied in boxes of one dozen.

Bi-palatinoids (Messrs. Oppenheimer, Son & Co. Ltd.) are small soluble capsules separated by a diaphragm into two compartments. In each of these a separate drug may be packed so as to prevent chemical interaction occurring between them until the stomach is reached. We have found this a very satisfactory method of administering certain combinations of drugs.

Bynogen.—We have remarked in previous years on the inevitableness of casein-glycophosphate preparations. Every good firm puts up a preparation of this kind, giving it a name of its own. Messrs. Allen & Hanburys have gone a step further, adding dextrin and maltose to their combination of milk proteid with glycophosphates. 'Bynogen' is readily made up, and its flavour is pleasant.

Camphor in Oil Ampoules (Parke, Davis & Co.).—The hypodermic injection of camphor is held by some to be of value as a cardiac stimulant in

peritonitis, acute fevers, during or after operations, etc. Two sizes of ampoules are supplied, respectively containing 3 gr. of camphor in 1 c.c. of pure olive oil, and 36 gr. in 10 c.c. The customary dose is from 15 to 30 minims injected hypodermically.

Cascativa is a concentrated pharmaceutical preparation obtained from the finest bark of *Rhamnus purshianus*. It is put up by Messrs. Reynolds & Branson Ltd., who claim for it marked advantages over the B.P. fluid extract, in that it is more active and therefore equally efficient in a smaller dose. It is also put up in capsule form in 10, 20, and 30 minims. This preparation can be confidently recommended as combining efficiency with palatability.

Collosol Bismuth is a development of the Crookes Laboratories. It is prepared chemically, and exhibits the characteristic brownian movements of a true colloid. It contains a small proportion of active bismuth, the energetic action of which soon establishes itself; yet the solution is absolutely innocuous—no symptoms of intolerance are ever experienced. It never exerts the slightest injurious effects even in the most delicate organism. A preparation prepared electrolytically, which is not so stable, has found favour in France in the treatment of whooping-cough. In fact, a thesis based on this method was defended before the Faculty of Medicine of Paris as long ago as November 26, 1902, and the results shown by graphic diagrams were certainly striking.

Dosage (daily amount): Infants up to 6 months, 4 tablespoonfuls; from $\frac{1}{2}$ to 2 years, 6 tablespoonfuls; from 2 years upwards, 8 tablespoonfuls. The quantity may be given in one or several doses without dilution and irrespective of meals. It may be taken in milk. It is issued by Messrs. Oppenheimer, Son & Co. Ltd.

Cystazol is a combination of hexamethylenetetramine (hexamine, urotropine) with sodium benzoate, prepared by Messrs. Allen & Hanburys for use as a urinary antiseptic. Its *raison d'être* lies in: (1) Liberation of benzoic acid in the urine; (2) Acidification of the urine and consequent increase in the antiseptic action of the formaldehyde set free from the urotropine; (3) Addition of the antiseptic action of benzoic acid to that of urotropine. We have found this drug useful in coli-cystitis, and it might well be applied to the urinary disinfection of typhoid carriers. It is sold in 10-gr. tablets, one to three constituting a dose.

Formitrol pastilles are now issued by Messrs. A. Wander Ltd. in small flat tins, convenient for carrying in the pocket. For efficiency and pleasantness we consider these pastilles second to none of their kind.

Galyi, Hectine, and Hectargyre.—In these days, when German salvarsan is not to be had, and our own reproductions of the compound are not yet wholly satisfactory, it is well to realize that there are alternative French preparations which may in the end prove as valuable as Ehrlich's much-boomed products. The arsenical compounds named above have already been tried by British syphilologists with encouraging results, and it is therefore important to know that they are sold in this country by M. Bresillon & Co., Gamage Buildings, Holborn, E.C.

Gelatin-Saline Injections.—The experiments of Hogan with a solution of gelatin in saline for injection or transfusion in conditions of shock and hæmorrhage seem to indicate a future for this plan of treatment. At least it is worthy of trial. The theory underlying its use is that plain normal saline solution when injected into the human body does only temporary good, because it is followed by an increase in the output of fluid from the body. If, however, it be reinforced by a colloid such as gelatin, the urinary excretion remains normal, so that the stimulant value of the injection is maintained instead of being quickly neutralized by the subsequent loss of body fluids. As was discovered when the injection of gelatin was introduced as a means of promoting coagulation (in aneurysms, etc.), its sterilization is a difficult

and important matter. Messrs. Allen & Hanburys are therefore putting up an 'azoule' of gelatin-saline solution 50 c.c., with sufficient sodium chloride and sodium carbonate (in a separate sterile tube) to make 500 c.c. of transfusion fluid. The cost is 2/6 per complete set.

Instrol has already found its niche in the practitioner's armamentarium. It is an efficient bactericide, having a co-efficient equal to that of an 18 per cent solution of carbolic acid. Though water-soluble, it will 'destroy bacteria in greasy media. No heating or preparation is necessary. It prevents the rusting of steel by inducing passivity. The edges of instruments are protected from oxidation, even if they are allowed to dry in the air. The lustre of the metal is preserved. By means of 'Instrol,' instruments can always be kept in perfect condition ready for use. In the hospital and surgery the advantage of having all instruments ready for immediate use in a clean and sterile condition cannot be over-estimated. It is supplied by Messrs. Allen & Hanburys of the proper strength for immediate use without dilution. All metal instruments are simply immersed in 'Instrol' until required for use. Flat glass trays are the most suitable vessels for the purpose; they should be covered with glass to exclude dust. The instruments should be rinsed in warm water before use to remove adhering solution.

India-rubber articles should not be placed with metal instruments in 'Instrol.' Such articles should be sterilized separately, as the sulphur they contain renders the solution cloudy and attacks metal.

We trust that this preparation is finding the employment that it deserves in military as well as in civil surgery.

Iodex.—This well-known non-irritating preparation of iodine is now dispensed in the form of suppositories and pessaries, as well as in liquid and ointment. Uses for these new preparations will readily suggest themselves. They are supplied by Menley & James Ltd., Menley House, Farringdon Road, E.C.

Laxase Tablets meet a distinct need in providing a convenient form for the administration of agar-agar. This substance absorbs water and swells up in the bowel, acting mechanically as a laxative. Messrs. Allen & Hanburys issue plain Laxase tablets, and others in which various drugs (phenolphthalein, oloin, cascara, beta-naphthol, lactic acid bacilli) are combined with the agar-agar. Though necessarily a little expensive (a halfpenny per tablet), these preparations should find a cordial reception from the profession.

Lymphagogue Tablets and Citrated Saline Powder are preparations by Messrs. Allen & Hanburys designed to facilitate the application of the hypertonic treatment of wounds which is described fully in an article on wound infections in the body of this volume (*see p. 669*). Some useful suggestions as to methods are sent out with each package. These preparations will no doubt receive extensive trial at the front, and they are admirably suited by their compactness to meet the exigencies of surgical practice in the war zone.

Marienbad Pulverettes.—Prior to the outbreak of war, the Oppenheimer Laboratories made and supplied the cholagogue which was used in the spa treatment of Marienbad. This was supplied in pulverette form according to the prescription of Abbot Tepl. Messrs. Oppenheimer, Son & Co. Ltd. (an entirely British house since its foundation) are therefore in a position to meet any demands for the identical preparation which was formerly only obtainable in the Austrian spa treatment of Marienbad.

Nucleo-Proteid Compound Tablets (Parke, Davis & Co.).—Each of these tablets contains 1 gr. potassium glycerophosphate, 1 gr. calcium glycerophosphate, $\frac{1}{2}$ gr. lecithin, and $\frac{1}{2}$ gr. nuclein. This combination has been found of service in the treatment of nervous exhaustion and other mani-

festations of disordered nutrition. In the debility which follows severe illness, these tablets are also found extremely useful. They are supplied in bottles of 100. The dose is one or more tablets thrice daily after food.

Osacol is a pleasant jelly preparation of 'Petremol,' a pure form of medicinal paraffin sold by Messrs. Oppenheimer, Son & Co. Ltd. In a basis of the finest extract of malt (cream of malt) and the purest honey, 75 per cent of petremol by volume has been incorporated. The preparation is pleasing both to the eye and palate, and has been described as pharmaceutically perfect. It does not separate. The numerous suggestions of their medical clientèle for a paraffin preparation induced the Oppenheimer Laboratories to experiment. As a result, 'Osacol' was submitted to them for clinical trials, and it was consequent upon those reports that it was placed upon the market. In all conditions calling for gentle evacuant action without any deleterious effect, 'Osacol' has proved of distinct service. Patients who find paraffin oil repellent will readily take 'Osacol.'

Ovaltine (A. Wander Ltd.) maintains its popularity as an invalid food. In war times it should be borne in mind as an excellent food for patients suffering from one or other of the typhoid infections.

Parathyroid Gland Tablets (Parke, Davis & Co.).—Each tablet contains $\frac{1}{10}$ gr. of desiccated parathyroids, representing $\frac{3}{8}$ gr. of fresh glandular tissue from cattle, collected with special precautions against contamination with extraneous material. The precise indications for the administration of parathyroid gland have not yet been determined, but good results have been claimed in such conditions as paralysis agitans, eclampsia, chorea, epilepsy, tetany, and uræmia. The dose that has been suggested is one tablet once or twice daily; treatment is generally necessary for a considerable period—at least one or two months. The tablets are supplied in bottles of 100.

Pineal Gland Tablets (Parke, Davis & Co.).—Each tablet represents $\frac{1}{2}$ gr. of fresh pineal gland substance from young cattle. The pineal body is believed to discharge an important biological function up to the time of puberty. Recent work appears to indicate that when the substance is administered orally to backward children, mental and physical development may be stimulated. While its use has not been sufficiently extensive to determine its precise value, the results obtained appear to warrant the belief that its administration may be beneficial in functionally retarded mentality in children without evident physical defects, and also in mongolism. The substance has also appeared to have a mentally stimulating effect in cases of premature mental failure in later life without distinct organic cause. The suggested dose is one tablet thrice daily over a period of several months, the dose being increased or decreased according as the effects may indicate. The tablets are supplied in bottles of 25 or 100.

Pinheroin (Oppenheimer, Son & Co. Ltd.) is by this time well known to our readers as an effective and reliable means of administering heroin. Each teaspoonful contains 1 gr. of terpin hydrate and $\frac{1}{10}$ gr. of heroin hydrochloride.

Pituitary Gland (Posterior Lobe) Tablets (Parke, Davis & Co.).—Each tablet represents 3 gr. of fresh posterior lobe (infundibular portion) of the pituitary body. While probably the most valuable therapeutic effects of the posterior lobe are only to be obtained by the hypodermic or intravenous administration of its extract (pituin), for example in uterine inertia, uterine and pulmonary hæmorrhage, intestinal paresis, shock, etc., the oral administration of the substance has been credited with good results in acromegaly, osteomalacia, rickets, paralysis agitans, dropsy, urticaria, and other skin diseases. The oral administration is said to be unaccompanied by the increase in blood-pressure which follows its hypodermic administration. These tablets are supplied in bottles of 25.

Pollen Toxin (Allen & Hanburys) for the treatment of hay fever.—The connection between the form of recurrent catarrh known as hay fever and the soluble toxins of various pollens, is now regarded as established. The injection of pollen toxin into animals gives rise to an antitoxin having the specific power of neutralizing this toxin. Similarly in hay-fever patients, injection of the toxin produces an immunity reaction. Pollen toxin is, therefore, employed to raise the immunity of those subject to hay fever, either prophylactically during the winter season or curatively during an attack. The sensitiveness of hay-fever patients to pollen toxin varies considerably, and in order that the dose may be adjusted to this sensitiveness, ophthalmic-test solutions are supplied of the following strengths: 5, 25, 100, 500, 1000, 2500, and 5000 units. To apply the test, the contents of the 5-unit tube are dropped on one of the eyeballs, and after a few minutes the eye is examined for signs of reaction, indicated by slight reddening. If no reaction occurs, the next stronger tube is employed, and so on, using each eye alternately. If the 5-unit test produces a reaction, the dose of toxin for hypodermic injection will be 2 to 4 units; if the 25-unit test be required to produce the reaction, the dose will be 10 to 20 units, and so on. The ophthalmic reaction is not produced, even by the strongest test solution, in normal persons. The doses of pollen-toxin vaccine are given at intervals of ten to fourteen days; the dose may be gradually increased and the patient's resistance re-examined if necessary.

'Ratin.'—The exigencies of war and the necessity for conserving the national resources, and, more important still, the interests of public health and hygiene, have again focused official and public attention upon the supreme importance of exterminating rats and mice.

As is well known, these vermin cause an economic loss in the United Kingdom, which loss has been estimated by competent authorities to be not less than £20,000,000 per annum, and as 'carriers' of disease, largely through the parasites infesting these rodents, especially rats, they are a distinct source of danger. Diseases such as plague, trichinosis, foot-and-mouth disease, tuberculosis, etc., have directly followed the appearance of numbers of rats.

Those responsible for the maintenance of public health have utilized a number of remedies, but it would appear that the best results have accrued by the use of a bacterial culture called 'Ratin' (Ratin Bacteriological Laboratory, Windsor House, Kingsway, W.C.), which has ample evidence to support its claims as an ideal exterminator of rats and mice. Amongst its important clientele are The Crown Agents for the Colonies, The Newcastle, Middlesbrough, Stepney, Portsmouth, Bute, Southwark, East Suffolk, Edmonton, Leyton, and other local authorities, principal railways, etc.

Roboleine is composed of the finest extract of malt with the red marrow from the long bones of the calf, and the expressed juice from the rib bones of the same animal, specially collected at the London abattoirs, together with 1 gr. each of hypophosphites of lime, soda, and potash in the tablespoonful. This product was tested comparatively with cod-liver oil preparations in several special institutions, and it is claimed that patients more rapidly increased in weight and improved in general condition when taking roboline. Testing it on a smaller scale, we have found it generally satisfactory. It is issued by Messrs. Oppenheimer, Son & Co. Ltd.

Silvol (Parke, Davis & Co.).—Silvol is a proteid silver compound containing about 20 per cent of the metal. It is in the form of scales which are readily soluble in water. The solution is stable, is not precipitated by proteids or alkalies, and when applied to mucous surfaces it does not cause coagulation of albuminous matter or the precipitation of chloride. It penetrates the tissues, and exerts an antiseptic, astringent, and sedative influence without causing irritation.

Silvol may be used in cases of specific urethritis, inflammatory conditions of the eye, ear, nose, throat, bladder, vagina, uterus, etc., in solutions of

various strengths according to the condition to be treated. Even so strong a solution as 1-2 is non-toxic.

Silvol is supplied in bottles of 1 oz., also in bottles of 50 capsules each containing 6 gr., a convenient quantity for making a small quantity of solution extemporaneously.

Thymotussin (Oppenheimer, Son & Co. Ltd.).—This is a palatable preparation prepared from fresh green thyme (*Thymus vulgaris*) and other species of thyme, combined with honey, aromatics, and bromoform. It is widely used on the Continent, and various reports state that it is of value in whooping-cough. It is also largely prescribed in laryngitis, bronchial catarrh, emphysema, etc. Children take it readily owing to its palatability.

Thymozote Globules (Parke, Davis & Co.).—Thymozote is the name given to the benzoate of thymol, which possesses the tæniacide properties of thymol, but is preferable for medicinal use, as it is practically tasteless and is less liable to cause digestive disturbance. Its administration has been recommended in ankylostomiasis, also for the expulsion of the tape-worm.

It is important that, while the drug is being administered, the patient should abstain from all fatty foods or alcoholic drinks, as their presence in the digestive tract might lead to absorption of thymol, which is most undesirable. The following procedure is suggested: The patient is to be kept on light diet for twenty-four hours (no butter, fats, or alcoholic drinks); a saline cathartic should then be administered, and after its effect has passed, the bowel should be cleansed with a soap-and-water enema. An adult should then take two thymozote globules every two hours for three doses. Children (not under seven years of age) should have one globule every hour for three doses. If the patient cannot swallow the globule, it may be punctured, and the contents given on a lump of sugar. For at least half an hour after each dose, the patient should lie on the right side to favour transit of the drug into the intestine. No food should be allowed during treatment. Two hours after the last dose, the saline cathartic should be repeated. Afterwards

a little tea or coffee (without milk) may be given, or fat-free broths, and when the purge has acted well, light diet may be resumed, but no butter, fatty food, or alcoholic liquor must be permitted for some hours. The treatment here outlined should be repeated at intervals of three to six days, so long as ova can be detected microscopically in the faeces.

Typhoid-paratyphoid Agglutometer (Parke, Davis & Co.).—This outfit (*Fig. 94*), it is claimed, supplies in a small compass all that the practitioner requires for the purpose of promptly and conveniently diagnosing a case of typhoid or paratyphoid fever, and of discriminating between the two.

The method is extremely simple in practice; it obviates

the use of the microscope and fresh live cultures of bacilli; yet laboratory and clinical tests have shown that it is equal in delicacy and efficiency to the microscopic method. The 'P., D. & Co.' typhoid-paratyphoid agglutometer provides sufficient material for applying the test on ten separate occasions. Explicit directions for conducting the test are enclosed in the outfit.

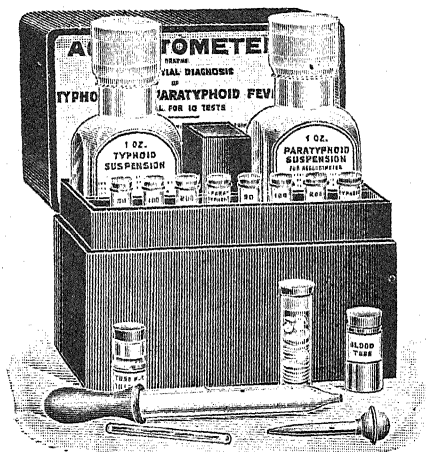


Fig. 94.

Experience gained during the present war is, however, proving that the agglutination test for typhoid and paratyphoid infections is one that can scarcely be handled in this 'rule-of-thumb' manner, and we think many practitioners will still be content to send the patient's blood to a skilled pathologist, and accept his verdict as to the agglutinins which it contains.

Vaccines.—Messrs. Duncan, Flockhart & Co., of Edinburgh, have sent us a number of samples of the vaccines which they are distributing on behalf of the laboratory of the Royal College of Physicians, Edinburgh, where they are made. The fact that these preparations emanate from so trustworthy a source speaks for itself, and should commend them to those who use stock vaccines in their practice. Autogenous vaccines are prepared, in accordance with directions issued, in the same laboratory.

The Department for Therapeutic Inoculation at St. Mary's Hospital, London, under the direction of Sir Almroth Wright, has added several prophylactic vaccines to the series previously issued through the agency of Messrs. Parke, Davis & Co., for the use of the medical profession. These prophylactic vaccines are applicable for the protective inoculation of persons who may be about to incur risk of infection by the microbes indicated; they are all supplied in sets of two doses, as required for one individual, to be administered with an interval of ten days between the first and second dose. For use when several individuals have to be immunized, the vaccines are also supplied in bottles of 25 c.c.—sufficient for the double inoculation of sixteen adults. Specimens have been submitted to us of anti-cholera vaccine, anti-meningococcus vaccine, anti-plague vaccine, anti-typhoid-paratyphoid vaccine, for protection against both typhoid and paratyphoid infection. There are similarly put up anti-paratyphoid vaccine for immunization to *B. paratyphosus* (*A* and *B*), also anti-typhoid-paratyphoid-cholera vaccine for use when it is desired to protect individuals against those infections and time does not allow of administering the separate vaccines. A vaccine of this type has been widely used in Serbia.

It may be mentioned that in addition to the prophylactic 'anti-meningococcus vaccine,' St. Mary's Hospital also supplies 'meningococcus vaccine' for use in the treatment of epidemic cerebrospinal meningitis.

Water-sterilizing Tablets (Parke, Davis & Co.).—Each tablet contains 16 gr. of sodium bisulphate flavoured with oil of lemon and saccharin. Large quantities of these tablets have been supplied to the War Office authorities, who recommend that they be used whenever water is liable to be contaminated by disease germs or other impurities. It has been proved that one tablet dissolved in a pint of water heavily contaminated with typhoid and cholera germs will render it sterile within fifteen to thirty minutes. Moreover, an agreeable flavour and acidity are imparted to the water. Fifty tablets are supplied in a convenient pocket phial with a metal screw cap.

BOOKS OF THE YEAR.

A LIST OF THE PRINCIPAL MEDICAL WORKS AND NEW EDITIONS
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^{2,2} For the convenience of our readers any of the works in this list can be obtained from
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- Bodmin.**—*Cornwall County Asylum.* Res. Med. Supt., Dr. Francis Dudley. Access—Bodmin station, G.W. and L.S.W.
- Box (Wilts).**—*Kingsdown House,* 5 miles from Bath. Res. Med. Supt., Dr. H. C. MacBryan. Access—Box. *See also p. 877*

Brentwood.—*Essex and Colchester Asylum.* Res. Med. Supt., Dr. John Turner. Access—Brentwood station, $\frac{1}{2}$ mile.

Littleton Hall, Brentwood, Essex (for ladies). Res. Med. Licensee. Dr. H. R. Haynes. Access—Brentwood and Shenfield stations, $1\frac{1}{2}$ miles.

Bridgend.—*Glamorgan County Asylum.* Res. Med. Supt., D. Finlay, M.D. Access—Bridgend, $1\frac{1}{2}$ miles.

Bristol.—*Bristolington House.* Proprietress, Mrs. Bonville Fox. Res. Physician, Dr. J. M. Rutherford. Access—Bristol, 3 miles.

City and County Asylum, Fishponds. Res. Med. Supt., J. Vincent Blackford, M.D. Clerk and Steward, Arthur Orme. Access—Fishponds station, 1 mile.

Northwoods House, Winterbourne, 7 miles from Bristol. Res. Med. Prop., J. D. Thomas, B.A., M.B., B.C. Access—By taxicab from Bristol, Fishponds, Winterbourne, or Patchway stations. See p. 883

Royal Victoria Home, Horfield, Bristol. Certified under the Mental Deficiency Act 1913, for 42 female patients. Med. Supt., Dr. C. Bernard. Access—Montpelier and Bristol stations.

Stoke Park Colony, Stapleton, near Bristol (for mentally defective children). Certified under the Mental Deficiency Act, 1913, for 950 patients. Res. Med. Off., Dr. D. Fleck. The Warden, Incorporation of National Institutions for Persons requiring Care and Control, 14, Howick Place, S.W. Access—Stapleton Road station, $1\frac{1}{2}$ miles; Filton station, 1 mile. See also p. 886

Bromsgrove (Wores.).—*Worcestershire Asylum, "Barnsley Hall."* Res. Med. Supt., Dr. P. T. Hughes. Access—Bromsgrove, M.R., $2\frac{1}{2}$ mls.

Burgess Hill (Sussex).—*St. George's Retreat.* Licensee, Miss E. Ward. Access—Burgess Hill station.

Burley-in-Wharfedale (Yorks.).—*West Riding Asylum, Scalebor Park.* Res. Med. Supt., Dr. J. R. Gilmour. Access—Burley-in-Wharfedale station, Mid. & N.E., $\frac{1}{4}$ mile.

Buxton.—*Wye House.* Res. Med. Supt., Graeme Dickson, L.R.C.P. & S., and Res. Asst. Med. Officers. Access—Buxton, L. & N.W.R. and M.R., 10 minutes. See also p. 881

Caerleon (Mon.).—*Newport Borough Asylum.* Res. Med. Supt., W. F. Nelis, M.D. Access—Caerleon, $\frac{1}{2}$ ml.

Cambridge.—*County Asylum.* Res. Med. Supt., Dr. A. D. Thompson. Access—Cambridge stat., 3 miles.

Canterbury.—*Stone House, St. Martin's.* Res. Med. Supt., Dr. E. F. Sall. Access—Canterbury East.

Cardiff.—*Cardiff City Mental Hospital, Whitechurch.* Res. Med. Supt., E. Goodall, M.D. Access—Llandaff, T.V.R., 1 mile. (Temporarily in use as a War Hospital.)

Carlisle.—*Cumberland & Westmorland Counties Asylum.* Res. Med. Supt., W. F. Farquharson, M.D. Access—Carlisle, 3 miles.

Carlow.—*District Asylum.* Res. Med. Supt., Dr. T. A. Greene. Access—Carlow, $\frac{1}{4}$ mile.

Carmarthen.—*Joint Counties Asylum.* Res. Med. Supt., J. Richards, F.R.C.S.E. Access—Carmarthen, 2 miles.

Castlebar (Co. Mayo).—*District Asylum.* Res. Med. Supt., F. C. Ellison, M.D. Access—Castlebar, 1 mile.

Chartham (near Canterbury).—*Kent County Asylum.* Res. Med. Supt., G. C. Fitzgerald, M.D. Access—Chartham station, 1 mile.

Cheadle.—*Cheadle Royal Mental Hospital.* Res. Med. Supt., W. Scowcroft, L.R.C.P., M.R.C.S. Access—Cheadle, 2 miles.

Chester.—*Cheshire County Asylum,* Res. Med. Supt., G. Hamilton Grills, M.D. Station, $1\frac{1}{2}$ miles.

Chichester.—*West Sussex County Asylum, Graylingwell.* Res. Med. Supt., Dr. H. A. Kidd. Access—Chichester stat., $1\frac{1}{2}$ miles. (Temporarily in use as a War Hospital.)

Church Stretton.—*Stretton House, Shropshire* (for gentlemen). Res. Supt., Dr. A. A. Watson. Res. Med. Off., Dr. J. W. W. Adamson. Access—Church Stretton station, $\frac{1}{4}$ mile. See also p. 877

- The Grove House*, All Stretton, Shropshire (for ladies). Res. Prop. and Med. Supt., Dr. J. McClintock.
- Clonmel.**—*District Asylum*. Res. Med. Supt., Dr. Bagenal C. Harvey. Access—Clonmel, 1 mile.
- Colchester.**—*Royal Eastern Counties Institution for Imbeciles and the Feeble-minded*. Res. Med. Supt., Dr. F. Douglas Turner. Sec., A. Turner. Access—Colchester.
- Cork.**—*District Asylum*. Res. Med. Supt., Dr. J. J. FitzGerald. Access—Cork, 2 miles.
- Lindville*, Cork. Med. Supt., Dr. C. A. P. Osburne.
- Cupar (Fifeshire).**—*Fife and Kinross District Asylum*. Res. Med. Supt., James H. Skcen, M.B. Access—Springfield stat., N.B.R., $\frac{3}{4}$ mile.
- Darlington (Durham).**—*Dinsdale Park*. Res. Med. Supt., H. W. Kershaw, M.R.C.S. Access—Darlington, 5 miles; Dinsdale, 1 mile.
- Middleton Hall*, Middleton St. George, Co. Durham. Res. Med. Supt., L. Harris-Liston, M.D. Access—Dinsdale station, 1 mile.
- Dartford.**—*City of London Mental Hospital*, near Dartford. Res. Med. Supt., Dr. R. H. Steen. Access—S.E.R., Dartford, $1\frac{1}{2}$ miles.
- Denbigh (N. Wales).**—*North Wales Counties Asylum*. Med. Supt., Dr. W. Stanley Hughes. Access—Denbigh, 1 mile.
- Derby.**—*Borough Mental Hospital*, Rowditch. Res. Med. Supt., Dr. S. R. Macphail. Access—G.N.R. station, 1 mile; M.R., 2 miles. Private patients received.
- See also p. 887
- The County Asylum*, Mickleover. Res. Med. Supt., M. L. Rowan, M.D. Access—Derby, M.R., 5 miles; Mickleover, G.N.R., 2 mls.
- Devizes.**—*Wills County Asylum*. Res. Med. Supt., S. J. Cole, M.D., Access—Devizes, 1 mile.
- Dorchester.**—*The County Asylum*, "Herrison." Med. Supt., P. W. Macdonald, M.D. Access—Dorchester, 3 miles. See also p. 886
- Downpatrick.**—*District Asylum*. Res. Med. Supt., M. J. Nolan, L.R.C.P.I. & L.M. Access—Downpatrick, 1 ml.
- Dublin.**—*Bloomfield*, Morehampton Road. Med. Officer, H. T. Bewley, M.D. Access—Dublin, 1 mile.
- Elm Lawn*, Dundrum, Co. Dublin (ladies). Prop., Miss Bernard. Vis. Phys., Dr. J. W. Usher.
- Farnham House and Maryville*, Finglas, Dublin (for 56 patients, both sexes). Res. Med. Supt., H. P. D'Arcy Benson, M.D., M.R.C.P., F.R.C.S. Ed. Access—Cab from Dublin, 2 miles. Tel. No. 1470 Dublin. See also p. 887
- Hartfield Retreat*, Drumcondra. Prop., J. J. Magrath, Esq. Access—Dublin, 2 miles.
- Highfield* (for ladies), Drumcondra; *Hampstead* (for gentlemen), Glasnevin. Res. Med. Supts., Hy. M. Eustace, B.A., M.D., & Wm. N. Eustace, L.R.C.P.I. & S.I. Access—By rail, Dublin. See also p. 887
- House of St. John of God*, Stillorgan, Duulin. Res. Phys., Dr. P. O'Connell. Access—Stillorgan station, $\frac{1}{2}$ mile; Dublin, 5 miles.
- Richmond District Asylum*, Dublin. Res. Med. Supt., Dr. J. O'Connor Donelan. Access—Dublin.
- St. Patrick's Hospital*, James Street, Dublin. Res. Med. Supt., Dr. R. R. Leeper. Branch Asylum, *St. Edmundsbury*, at Lucan.
- St. Vincent's Asylum*, Fairview, Dublin. Vis. Med. Supt., John Murphy, F.R.C.P.I. Apply to the Superioress.
- Stewart Institution*, Palmerston, Chapelizod, Co. Dublin. Res. Med. Supt., F. E. Rainsford, M.D. Access—Kingsbridge station, $2\frac{1}{2}$ miles.
- Verville*, Clontarf, near Dublin. Prop., J. J. Magrath, Esq. Access—Dublin.
- Woodbine Lodge*, Rathfarnham, 6 miles (ladies). Prop., Mrs. Bishop. Med. Supt., Dr. A. Croly. Access—Rathfarnham tram, 2 miles.
- Dudley (Stafford).**—*Ashwood House*, Kingswinford. Props., Drs. Peacock and Pietersen. Res. Med. Supt., Dr. J. F. G. Pietersen. Access—Stourbridge Junc., $3\frac{1}{2}$ miles, Dudley station, 4 miles; Wolverhampton, 7 miles. Tel.: 19 Kingswinford. See also p. 883

Dumfries.—*Crichton Royal Institution*. Res. Med. Supt., Dr. C. C. Easterbrook. Access—Dumfries, 1 mile.

Dundee.—*Baldovan Institution* (for the treatment and education of the feeble-minded). Med. Supt., D. M. Greig, F.R.C.S.Ed. Access—Dundee, 1 mile.

Royal Asylum, Dundee, and *District Asylum*, Westgreen, Dundee. Res. Med. Supt., W. Tuach-Mackenzie, M.D. Access—Dundee, 3 miles; Liff, 1½ miles.

Durham.—*County Asylum*, Winter-ton. Res. Med. Supt., Dr. H. G. Cribb. Access—Sedgefield station, 2½ miles, by bus.

Earlswood.—*The Royal Earlswood Institution for Mental Defectives*. Sec., H. Howard, 14 & 16, Ludgate Hill, E.C. Res. Med. Supt., Dr. Charles Caldecott. Access—Earlswood station or Red Hill Junc., 1½ miles.

East Harling, near Thetford (Norfolk).—*Guilfordcross* (Eastern Counties Institution). Certified under the Mental Deficiency Act 1913, for 410 male patients. Res. Med. Supt., Dr. E. J. Manning. Access—Harling Road station, 3½ miles.

Edinburgh.—*Edinburgh District Asylum*, Bangour Village, West Lothian. Res. Med. Supt., J. Keay, M.D.

Midlothian and Peebles District Asylum. Res. Med. Supt., R. B. Mitchell, M.D. Access—Rosslynlee station, 1 mile.

Royal Edinburgh Asylum, Morningside. Res. Phys. Supt., Dr. G. M. Robertson. Access—Edinburgh, 1½ miles.

New Saughton Hall, Polton. Med. Supt., J. Batty Tuke, M.D., F.R.C.P. Edin. Access—Polton station, 5 minutes; Loanhead, 10 minutes' walk. See also p. 879

Elgin.—*District Asylum*. Res. Supt., Alexander Hendry. Vis. Med. Off., Dr. D. G. Campbell. Access—Elgin, 1½ miles.

Ennis.—*District Asylum*. Res. Med. Supt., Dr. F. O'Mara. Access—Ennis station, 2 miles

Enniscorthy (Co. Wexford).—*District Lunatic Asylum*. Res. Med. Supt., Thos. Drapes, M.B. Access—Enniscorthy, 1 mile.

Epsom (Surrey).—*The Silver Birches*, Church Street (for ladies). Res. Licensee, Miss Daniel. Co-Licensee, Dr. E. C. Daniel. Access—L. & S.W.R. and L.B. & S.C.R., 5 mins. Tel. 346 P.O. Epsom. See also p. 886

Exeter.—*City Asylum*, Heavitree. Res. Med. Supt., G. N. Bartlett, M.B., B.S. Access—Exeter, 3 miles.

Court Hall, Kenton, near Exeter. Res. Licensees, Miss Mules, M.D., B.S., and Miss A. S. Mules. Access—Starcross, 1 mile.

Devon County Asylum, Exminster. Res. Med. Supt., Dr. Arthur N. Davis. Access—Exminster, 1½ miles; Exeter, 4 miles.

Wonford House (Hospital for the Insane). Res. Med. Supt., W. B. Morton, M.D. Access—Exeter station (Queen St.) 1½ miles; (St. David's) 2 miles.

Fairford (Gloucestershire).—*Fairford Retreat*. Res. Med. Prop., Dr. A. C. King-Turner. Access—Fairford.

Glasgow.—*District Asylum*, Woodilee. Res. Med. Supt., H. Carre, L.R.C.P. & S. Access—Lenzie station, 1 mile; Glasgow, 8 miles.

Glasgow District Hospital for Mental Diseases, Gartloch. Res. Med. Supt., W. A. Parker, M.B. Access—Garnkirk station, 1 mile.

Govan District Asylum, Hawkhead. Res. Med. Supt., Dr. J. H. MacDonald. Access—Crookston station.

Kirklands Asylum, Bothwell. Res. Med. Supt., Wm. M. Buchanan, M.B. Access—Bothwell and Fallside stations, ½ mile; Glasgow, 9 miles.

Lanark District Asylum, Hartwood, Lanarkshire. Med. Supt., Dr. N. T. Kerr. Access—Hartwood station, ¼ mile.

Royal Asylum, Gartnavel. Res. Phys. Supt., Landel R. Oswald, M.B.

Smithston Asylum, Greenock. Med. Off., Jas. Laurie, M.B. Access—Greenock West, 1½ miles.

Gloucester.—*Barnwood House*. Res. Med. Supt., J. G. Soutar, M.B., C.M. Access—Gloucester, 2 miles. *See also p. 884*

Gloucester County Asylums, Wotton and Barnwood, Gloucester. Res. Med. Supt., Dr. R. B. Smyth. Access—Gloucester station, 1 mile.

Guernsey.—*St. Peter Port Asylum*, Med. Off., E. K. Corbin, M.R.C.S. **addington, N.B.**—*District Asylum*. 17 miles from Edinburgh. Med. Supt., H. H. Robarts, M.D. Access—Haddington station, 10 minutes.

Hampton Wick.—*Normansfield* (for the care and training of the mentally deficient). Apply to the Res. Med. Supt. and Proprietor. *See also p. 884*

Hatton (near Warwick).—*County Asylum*. Res. Med. Supt., A. Miller, M.B. Access—Hatton G.W.R. station, 2 miles; Warwick, 3 miles.

Haywards Heath.—*Brighton County Borough Asylum*. Res. Med. Supt., C. Planck, M.A., M.R.C.S. Access—Haywards Heath, 1½ miles.

Hellingly.—*East Sussex County Asylum*. Res. Med. Supt., F. R. P. Taylor, M.D.

Henley-in-Arden (Warwickshire).—*Glen-dossill and Hurst Houses* (for both sexes). Res. Prop., Dr. S. H. Agar. Access—Henley-in-Arden, G.W.R., ¾ mile.

Hereford.—*County and City Asylum*, Res. Med. Supt., ——. Access—Barrs Court, G.W., Mid., and L. & N.W.R., Hereford, 3 miles.

Hitchin (Herts), near.—*Three Counties Asylum*. Res. Med. Supt., L. O. Fuller, M.R.C.S., L.R.C.P. Access—Three Counties stat., 1 mile.

Huddersfield (near).—*West Riding Asylum*, "*Storihes Hall*," Kirkburton. Res. Med. Supt., T. S. Adair, M.D.

Hull.—*City Asylum*. Res. Med. Supt., J. Merson, M.D. Access—Willerby station, 1 mile; Hull, 6 miles.

Inverness.—*District Asylum*. Med. Supt., T. C. Mackenzie, M.D. Access—Inverness, 2½ miles.

Ipswich.—*Borough Mental Hospital*. Res. Med. Supt., Dr. W. M. Ogilvie. Access—Ipswich, 2 miles.

Isle of Man.—*Lunatic Asylum*, Union Mills. Res. Med. Supt., W. Richardson, M.D. Access—Douglas, 3 miles.

Isle of Wight.—*The County Asylum*, Whitecroft. Res. Med. Supt., G. E. Peachell, M.D. Access—Blackwater, ¾ mile; Newport, 2½ miles.

Isleworth (Middlesex).—*Wyke House*. Res. Prop., Dr. F. Murchison. Access—Isleworth, Brentford, and Osterley station, 1 mile.

Ivybridge.—*Plymouth Borough Asylum*. Res. Med. Supt., W. H. Bowes, M.D. Access—Bittaford, ¼ mile; Wrangaton, G.W.R., 1½ miles; Ivybridge, 3 miles.

Jersey.—*Cranbourne Hall*, Grouville. Med. Supt., A. C. Stamberg, M.D. Access—Grouville, 2 mins. walk. *Jersey Asylum*. Res. Med. Supt., Julius Labey, M.R.C.S. Access—Gorey Village, 1 mile.

Kilkenny.—*District Asylum*. Res. Med. Supt., Louis Buggy, L.R.C.P. Access—Kilkenny station, ¼ mile.

Killarney.—*District Asylum*. Res. Med. Supt., E. W. Griffin, M.D. Access—Killarney, ½ mile.

Knowle (near Fareham).—*County Asylum*. Med. Supt., H. K. Abbott, M.D. Access—Knowle platform, ½ mile.

Lancashire (near Newton-le-Willows).—*Haydock Lodge*, Private Mental Hospital. Res. Med. Prop., Dr. C. T. Street. Access—Newton-le-Willows, 2 miles. *See also p. 872*

Lancaster.—*County Asylum*. Res. Med. Supt., D. M. Cassidy, M.D. Also *The Retreat*, for private patients. Access—Lancaster, L. & N.W. and Midland stations, each 1½ miles. *See also p. 878*

The Royal Albert Institution, Lancaster (for the feeble-minded of the Northern Counties; 750 patients). Acting Med. Supt., Dr. W. H. Coupland. Secretary, Saml. Keir. Access—Lancaster station, 1 mile; and *Brunton House*, a Private Home in connection with the Institution. *See also p. 886*

Larbert (Stirlingshire).—*Scottish National Institution* (for education of imbecile children). Med. Supt., Dr. R. D. Clarkson.

Leeds (near Menston).—*West Riding Asylum.* Res. Med. Supt., S. Edgerley, M.D. Access—Guiseley, 1 mile.

Leek (Stafford).—*County Mental Hospital,* Cheddleton. Med. Supt., W. F. Menzies, M.D. Access—Wall Grange station, 1 mile.

Leicester.—*Mental Hospital,* Hummerstone. Res. Med. Supt., J. F. Dixon, M.D. Access—Leicester.

Leicestershire and Rutland Asylum. Res. Med. Supt., R. C. Stewart, M.R.C.S. Access—Narborough, $\frac{3}{4}$ mile; Leicester, 6 miles.

Letterkenny.—*Donegal District Asylum.* Res. Med. Supt., E. E. Moore, M.D. Access—Letterkenny and Lough Swilly Rly., 1 mile.

Lichfield.—*County Mental Hospital,* Burntwood, near Lichfield. Res. Med. Supt., J. B. Spence, M.D. Access—Lichfield City, $3\frac{1}{2}$ miles; Trent Valley, $4\frac{1}{2}$ miles; Hammerwich, $1\frac{1}{2}$ miles.

Limerick.—*District Asylum.* Res. Med. Supt., Dr. E. D. O'Neill. Access—Limerick station, $\frac{1}{2}$ mile.

Lincoln.—*County Asylum,* Bracebridge. Res. Med. Supt., Dr. T. L. Johnston. Access— $2\frac{1}{2}$ miles from Lincoln G.N.R. station.

The Laven, Lincoln. Res. Med. Supt., Arthur P. Russell, M.B. Access—Lincoln station, 1 mile.

See also p. 881

Liverpool.—*Shaftesbury House,* Formby, near Liverpool and Southport. Res. Med. Supt., Stanley A. Gill, B.A., M.D. Access—Formby station, $\frac{1}{4}$ mile distant. *See also p. 874*

Tue Brook Villa, Liverpool, E. Res. Med. Supts., Drs. Tisdall & Ingall. Access—Tue Brook station or Green Lane car. *See also p. 886*

London.—*Bethlem Royal Hospital,* Lambeth Road, London, S.E. Physician Supt., J. G. Porter Phillips, M.D., M.R.C.P.

See also p. 876

Bethnal House, Cambridge Road, N.E. Res. Med. Supt., J. K. Will, M.D. Access—Cambridge Heath station.

Brooke House, Clapton, N.E. Res. Med. Supt., Dr. Gerald Johnston. Access—Clapton, G.E.R.

Camberwell House, Peckham Road, S.E. Res. Med. Supt., F. H. Edwards, M.D., M.R.C.P. Asst. Med. Offs., H. J. Norman, M.B., B.Ch., D.P.H., and Wm. Shearer, M.B., C.M. Tel., 'Psycholia, London.' Telephone, New Cross, 1057. *See also p. 880*

Chiswick House, Chiswick. Res. Lics., Dr. T. S. Tuke and C. M. Tuke, M.R.C.S. Access—Chiswick station, $\frac{1}{2}$ mile; Turnham Green station, 1 mile.

Clarence Lodge, Clapham Park, S.W. Prop., Mrs. F. Thwaites. Med. Off., Dr. Percy Smith. Access—Clapham Rd., and Clapham Common (Electric), 15 minutes. Tel. No. 494 Brixton. *See also p. 885*

Featherstone Hall, Southall (for ladies). Res. Med. Lic., W. H. Bailey, M.D. Access—Southall station, 5 minutes.

Fenstanton, Christchurch Road, Streatham Hill. Res. Med. Supt., J. H. Earls, M.D. Access—Tulse Hill, or Streatham Hill, 5 minutes.

Flower House, Catford, S.E. Res. Med. Supt., Dr. C. C. Bullmore. Access—C. & D.R., Beckenham Hill, 5 minutes.

Halliford House, Sunbury-on-Thames, S.W. Res. Med. Supt., W. J. H. Haslett, M.R.C.S. Access—Sunbury station, $1\frac{1}{4}$ miles.

Hayes Park (for ladies), Hayes, Middlesex. Res. Med. Off., Dr. H. F. Stilwell. Access—Hayes, 2 miles.

Hendon Grove Asylum (for ladies), Hendon. Med. Lic., H. L. de Caux, L.M.S.S.A., L.S.A. (Lond.). Access—By M.R., Hendon station, $\frac{1}{2}$ mile, or 'bus from Tube at Golder's Green. *See also p. 874*

London County Asylum, Banstead Downs, near Sutton, Surrey. Res. Med. Supt., Dr. P. C. Spark. Access—Belmont station, $\frac{1}{2}$ mile; Sutton station, $1\frac{1}{2}$ miles.

London County Asylum, Bexley, Kent. Res. Med. Supt., T. E. K. Stansfield, M.B. Access—Bexley station, $1\frac{1}{4}$ miles,

London County Asylum, Cane Hill, Coulsdon, Surrey. Acting Res. Med. Supt., Dr. E. S. Littlejohn. Access—Coulsdon, S.E.R., or Coulsdon and Smitham Downs, L.B. & S.C.R., 10 minutes.

London County Asylum, Claybury, Woodford Bridge, Essex. Res. Med. Supt., Robert Armstrong-Jones, M.D. Access—Woodford Bridge station, G.E.R., $1\frac{1}{2}$ miles.

London County Asylum, Colney Hatch, N. Res. Med. Supt., S. J. Gilfillan, M.A., M.B. Access—New Southgate, G.N.R.

London County Asylum, Hanwell. Res. Med. Supt., Dr. P. J. Bailly.

London County Asylum, Horton, Epsom. Res. Med. Supt., Dr. J. R. Lord. Access—L. & S.W. Ry., $1\frac{1}{2}$ miles, L.B. & S.C.R., $1\frac{1}{2}$ miles. (*Temporarily in use as a War Hospital.*)

London County Asylum, Long Grove, Epsom. Res. Med. Supt., D. Ogilvy, M.D. Access—L. & S.W.R. and L.B. & S.C.R.

London County Asylum, The Manor, Epsom. Res. Med. Supt., W. Ireland Donaldson, M.D. Access—L. & S.W. and L.B. & S.C.R.

London County Colony (for Insane Epileptics), Epsom. Res. Med. Supt., Dr. M. A. Collins. Access—L. & S.W. & L.B. & S.C.R. stations, $1\frac{1}{2}$ miles.

Middlesex County Asylum, Tooting, S.W. Med. Supt., R. Worth, M.B., B.S. Access—Wandsworth Common station, 1 mile.

Moorcroft House, Hillingdon, Uxbridge, 2 miles. Med. Licensees, Dr. J. F. Stilwell and Dr. R. J. Stilwell. Access—West Drayton station, 2 miles.

Newlands House, Tooting Bec Common, S.W. Prop. and Res. Phys., Dr. J. Noel Sergeant. Access—Balham station, 1 mile, and motor bus.

Northumberland House, Green Lanes, N. Res. Med. Supt., Bernard Hart, M.D. Access—Finsbury Park station, 1 mile. *See also p. 882*

Otto House, 47, North End Road, West Kensington (for ladies). Lic. Prop., A. H. Sutherland. Lady

Supt., Miss Brodie. Access—West Kensington station, 1 mile; Barons Court station (Piccadilly Tube), 1 mile. *See also p. 884*

Peckham House, 112, Peckham Road, S.E. Props., A. H. & H. G. Stocker. Res. Med. Supt., Dr. F. R. King. Access—Peckham Rye stat., 10 min. walk. *See also p. 875*

St. Luke's Hospital, Old St., E.C. Res. Med. Supt., Wm. Rawes, M.D., F.R.C.S. Convenient to principal London stations. *See also p. 875*

The Grange, East Finchley, N. Res. Licensees, Dr. F. and Mrs. Watson.

The Priory, Roehampton, S.W., near Richmond Park. Res. Med. Supt., James Chambers, M.D. Access—Barnes station, 10 mins.

West Ham Boro' Asylum, Goodmayes, Ilford. Res. Med. Supt., Dr. L. F. Hanbury. Access—Goodmayes, $\frac{3}{4}$ mile.

Wood End House, Hayes (ladies), Uxbridge, 3 miles. Med. Lic., Dr. R. J. Stilwell. Access—Hayes station, 1 mile.

Londonderry.—*District Asylum*. Res. Med. Supt., Dr. Hetherington. Access—Londonderry, 1 mile.

Macclesfield.—*Parkside Asylum*. Res. Med. Supt., H. Dove Cormac, M.B., M.S. Access—Macclesfield, 1 mile.

Maidstone.—*Kent County Asylum*. Res. Med. Supt., H. W. Lewis, M.D. Access—Maidstone, $1\frac{1}{2}$ miles.

West Malling Place, Kent. Res. Med. Supt., Dr. G. H. Adam. Access—Malling station, 1 mile.

Market Lavington (Wilts).—*Fiddington House*. Res. Med. Supt., J. R. Benson, F.R.C.S. Access—Lavington, G.W.R., 1 mile; Devizes, 6 miles. *See also p. 875*

Maryborough (Queen's County).—*District Asylum*. Res. Med. Supt., Dr. P. Coffey. Access—Maryborough, $\frac{1}{2}$ mile.

Melrose, N.B.—*Roxburgh, Berwick, and Selkirk District Asylum*. Res. Med. Supt., J. C. Johnstone, M.D. Access—Melrose, 1 mile.

Melton.—*Suffolk District Asylum*, near Woodbridge. Res. Med. Supt., J. R. Whitwell, M.B. Access—Melton station, $1\frac{1}{4}$ miles; Woodbridge station, $2\frac{1}{4}$ miles.

Merstham (Surrey).—*Surrey County Asylum*, Netherne. Med. Supt., Dr. P. C. Coombes. Access—Coulsdon station, 2 miles.

Middlesbro'.—*County Boro' Asylum*. Res. Med. Supt., Dr. J. W. Geddes. Access—Middlesbro', 2 miles.

Monaghan (Ireland).—*District Asylum*. Res. Med. Supt., Dr. T. P. Conlon. Access—Monaghan, $\frac{1}{4}$ mile.

Montrose, N.B.—*Montrose Royal Lunatic Asylum*. Med. Supt., C. J. Shaw, M.D. Access—Hillside, $\frac{1}{4}$ mile; Dabton, 1 mile.

Morpeth.—*Northumberland County Asylum*. Res. Med. Supt., Thos. W. McDowall, M.D. Access—Morpeth station, 1 mile, by 'bus.

Mullingar.—*District Asylum*. Res. Med. Supt., Dr. Laurence Gavin. Access—Mullingar station, 1 mile.

Newcastle-on-Tyne.—*City Asylum*. Gosforth. Res. Med. Supt., James T. Calleott, M.D. Access—Newcastle, 4 miles. (*Temporarily in use as a War Hospital.*)

Northampton.—*Berrywood Asylum*. Res. Med. Supt., W. Harding, M.D. Access—Castle station, $2\frac{1}{2}$ miles; Midland station, 3 miles.

St. Andrew's Hospital, Northampton. Med. Supt., D. F. Rambaut, M.A., M.D. (T.C. Dub.) Access—Northampton station, 1 mile.

See also p. 873

Norwich.—*Bethel Hospital for Mental Diseases*. Res. Med. Supt., S. J. Fielding, M.B. Cons. Phys., Saml. J. Barton, M.D. Access—Norwich (Thorpe) station, 1 mile.

See also p. 879

Heigham Hall, Norwich. Res. Med. Prop., J. G. Gordon-Munn, M.D. Access—Victoria station, 1 mile; Thorpe station, $1\frac{1}{2}$ miles.

Norfolk County Asylum, Thorpe, Norwich. Res. Med. Supt., D. G. Thomson, M.D. Access—Whitlingham, 1 mile; Norwich, $2\frac{1}{2}$ miles. (*Temporarily in use as a War Hospital.*)

Norwich City Asylum, Hellesdon, near Norwich. Res. Phys. and Supt., Dr. David Rice. Access—Hellesdon, 1 mile.

The Grove, Old Catton, near Norwich (for ladies). Res. Med. Supt., C. A. P. Osburne, F.R.C.S. Apply to the Misses McIntock.

Nottingham.—*City Asylum*, Mapperley Hill. Med. Supt., E. Powell, M.R.C.S.

Notts County Asylum. Res. Med. Supt., S. L. Jones, M.R.C.S. Access—Radcliffe-on-Trent, 2 miles.

The Coppice. Res. Med. Supt. David Hunter, M.B. (Camb.). Access—Midland station, $2\frac{1}{2}$ miles; Gt. Northern & Gt. Central station, $1\frac{1}{2}$ miles. *See also p. 876*

Omagh.—*District Asylum*. Res. Med. Supt., Dr. John Patrick. Access—Omagh station, 2 miles.

Oxford.—*County Asylum*, Littlemore. Res. Med. Supt., T. S. Good, M.R.C.S. Access—Littlemore station.

The Warneford, Oxford, $1\frac{1}{2}$ miles. Res. Med. Supt., Alex. W. Neill, M.D. Access—Oxford station, $2\frac{1}{4}$ miles. *See also p. 885*

Paisley.—*Craw Road Asylum*. Res. Med. Off., Mary P. Hislop, M.B., Ch.B. Access—Paisley, 1 mile.

Paisley District Asylum, Riccartbar. Med. Off., D. Fraser, M.D. Access—Paisley West, $\frac{1}{4}$ mile.

Renfrew District Asylum, Dykebar, Paisley. Res. Med. Supt., R. D. Hotchkis, M.D.

Perth.—*District Asylum*, Murthly. Res. Med. Supt., Lewis C. Bruce, M.D. Access—Murthly.

James Murray's Royal Asylum, Perth (for private patients only). Phys. Supt., R. Dods Brown, M.D., F.R.C.P. Ed. Access—Perth station, under 2 miles. *See also p. 883*

Plympton.—*Plympton House*, Plympton, South Devon. Res. Props., Dr. Alfred Turner and Dr. J. C. Nixon. Access—Plympton, 1 mile; Marsh Mills, 2 miles; Plymouth, 5 miles. *See also p. 884*

Portsmouth.—*Borough Mental Hospital*. Res. Med. Supt., H. Devine, M.D. (Lond.) Access—Fratton, $1\frac{1}{2}$ miles. *See also p. 885*

Prestwich (near Manchester).—*County Asylum*. Res. Med. Supt., Dr. F. Perceval. Acc.—Prestwich, $\frac{1}{2}$ mile.

Rainhill (nr. Liverpool).—*County Asylum.* Res. Med. Supt., T. P. Cowen, M.D. Access—St. Helens, 2½ miles; Rainhill, 1 mile.

Rotherham (Yorkshire).—*The Grange*, 5 miles from Sheffield (for ladies). Con. Phys., W. C. Clapham, M.D. Res. Phys., G. E. Mould, M.R.C.S., L.R.C.P. Access—Grange Lane station, G.C.R., ½ mile.

See also p. 885

St. Albans.—*Herts County Asylum*, Hill End. Med. Supt., A. N. Boycott, M.D. Access—Hill End station, G.N.R., 2 minutes.

Middlesex County Asylum, Napsbury, near St. Albans, Herts. Res. Med. Supt., L. W. Rolleston, M.B., B.S.

St. Leonards-on-Sea.—*Ashbrook Hall*, Hollington (for ladies). Res. Lics., Mr. and Mrs. Charles Somerset. Med. Off., Dr. Wm. E. Peck. Access—Warrior Square stat., 2 miles.

Salisbury.—*Fisherton House Asylum.* Med. Supt., Dr. R. T. Finch. Access—Salisbury station, 5 minutes.

Laverstock House, Salisbury. Acting Med. Supt., A. Wood Smith, M.D. Access—Salisbury, 1½ mls.

Sevenoaks (Kent).—*Riverhead House* (for ladies). Res. Med. Supt., Dr. Wm. H. C. Macartney. Access—Sevenoaks station, S.E.R., ¾ mile.

Shrewsbury.—*Shropshire County Asylum.* Res. Med. Supt., W. S. Hughes, M.B., B.S. Access—Shrewsbury station, 2½ miles.

Sleaford.—*Kesteven County Asylum.* Med. Supt., J. A. Ewan, M.A., M.D. Access—Rauceby, G.N.R., ¼ mile.

Sligo.—*District Asylum.* Res. Med. Supt., Dr. Joseph Petit. Access—Sligo station, 1½ miles.

Stafford.—*County Mental Hospital.* Res. Med. Supt., Dr. J. W. S. Christie. Access—Stafford, 1 mile.

Colton Hill Mental Hospital, Stafford. Res. Med. Supt., R. W. Hewson, L.R.C.S. & P. (Edin.). Access—Stafford, 1 mile.

See also p. 876

Starcross (near Exeter).—*Western Counties Institution* (for mental defectives). Res. Supt. Sec., E. W. Locke. Access—Starcross.

Stirling.—*District Asylum*, Larbert. Med. Supt., Dr. R. B. Campbell. Access—Larbert, 1½ miles.

Stone (near Aylesbury).—*Bucks County Asylum.* Res. Med. Supt., H. Kerr, M.D. Access—Aylesbury station, 3¼ miles.

Talgarth.—*Brecon and Radnor Asylum.* Res. Med. Supt., R. Pugh, M.D.

Tamworth (Staffs.).—*The Moat House* (for ladies). Res. Licensees, Edward Hollins, M.A., and Mrs. S. A. Michaux. Access—Tamworth stat., ¾ mile. See also p. 878

Taunton.—*Somerset & Bath Asylum*, Cotford, near Taunton. Res. Med. Supt., Dr. H. T. S. Aveline. Access—Norton Fitzwarren stat., 2 miles.

Ticehurst (Sussex).—*Ticehurst House.* Res. Med. Supt., Dr. H. Hayes Newington. Access—Wadhurst, 4 miles, or Ticehurst Road, 3 miles.

Tonbridge.—*Redlands.* Res. Med. Supt., W. A. Harmer, L.S.A. Access—Tonbridge junc., 2½ miles.

Virginia Water.—*Holloway Sanatorium*, Hospital for the Insane. St. Ann's Heath. Res. Med. Supt., W. D. Moore, M.D. Asst. Med. Offs., T. E. Harper, L.R.C.P., G. W. Smith, M.B., Emma M. Johnstone, L.R.C.P. & S., and C. Rutherford, M.B. Access—Virginia Water station, 5 minutes. Seaside Branch, St. Ann's, Canford Cliffs, Bournemouth. Med. Off., C. E. C. Williams, M.D. See also p. 882

Wadsley (near Sheffield).—*South Yorkshire Asylum.* Res. Med. Supt., W. J. N. Vincent, M.D. Access—Wadsley Bridge, 1 mile; Sheffield, 4 miles.

Wakefield.—*West Riding Asylum.* Res. Med. Supt., J. Shaw Bolton, M.D. Access—Kirkgate and Westgate station, 1 mile.

Wallingford (Berks.).—*Berkshire Asylum.*—Res. Med. Supt., J. W. A. Murdoch, M.B. Access—Cholsey 1 mile.

Warlingham (Surrey).—*Croydon Mental Hospital.* Res. Med. Supt., E. S. Pasmore, M.D. Access—Upper Warlingham, 3¼ miles.

Warrington (Lancs.).—*Lancashire County Asylum*, Winwick. Res. Med. Supt., A. Simpson, M.D. Access—Warrington, 2½ miles.

Warwick.—*Midland Counties Institution*, Knowle (for feeble-minded children). Sec., A. H. Williams Med. Off., J. O. Hollick, M.B.

Waterford.—*District Asylum*. Res. Med. Supt., J. A. Oakshott, M.D. Access—G.S. & W.R., North station, 2 miles.

St. Patrick's Private Asylum, Belmont Park. Conducted by the Brothers of Charity. Med. Supt., W. R. Morris, M.B. Access—Waterford station, 1 mile.

Wells.—*Somerset and Bath Asylum*, Wells, Som. Res. Med. Supt., Dr. G. Stevens Pope. Access—Wells station, 1½ miles.

Whitchurch (Salop).—*St. Mary's House* (ladies only). Res. Med. Supt., C. H. Gwynn, M.D. Access—Whitchurch, 1 mile. See also p. 881

Whitefield (near Manchester).—*Overdale*. Res. Phys., P. G. Mould, M.R.C.S. Access—Prestwich and Whitefield station, 1½ miles.

Whittingham (near Preston).—*County Asylum*. Res. Med. Supt., Dr. J. F. Gemmel. Access—Whittingham station, 3 minutes.

Whittington (near Chesterfield).—*Whittington Hall* (Midland Counties Institution). Certified under the Mental Deficiency Act 1913, for 400 female patients. Med. Supt., Dr. A. M. Palmer. Access—

Whittington station, ½ mile; Chesterfield, 5 miles.

Winchelsea (Sussex).—*Periteau*, near Hastings (for ladies). Res. Phys., Harvey Baird, M.D. Access—Winchelsea station, 1 mile.

Woking.—*Surrey County Asylum*, Brookwood. Res. Med. Supt., J. A. Lowry, M.D. Access—Brookwood station, 1½ miles.

Worcester.—*County & City Lunatic Asylum*, Powick. Res. Med. Supt., Dr. G. M. P. Braine-Hartnell. Access—Worcester station, 4 miles.

York.—*The Pleasance* (ladies only). Phys. Supt. and Res. Licensee, L. D. H. Baugh, M.B. Access—York, 1½ miles. See also p. 880

The Retreat, York. Res. Med. Supt., Bedford Pierce, M.D., F.R.C.P. (Lond.). Access—York station, 1½ miles. Also *Throxbury Hall*, a branch house, near Scarborough. See also p. 882

Bootham Park Registered Hospital, York. Res. Med. Supt., G. R. Jeffrey, M.D. Access—York stat., 1 mile. See also p. 881

North Riding of Yorkshire Asylum, Clifton. Res. Med. Supt., A. I. Eades. Access—York, 2 miles.

York City Asylum, Fulford, York. Res. Med. Supt., Dr. C. L. Hopkins.

SANATORIA FOR CONSUMPTION

AND OTHER FORMS OF TUBERCULOSIS.

Aberchaldor (N.B.).—*Inverness-shire Sanatorium*. Med. Supt., D. S. Johnston, M.D. Access—Aberchaldor, 2 miles.

Aysgarth, S.O. (Yorks).—*Wensleydale Sanatorium*. Physicians, D. Dunbar, M.B., B.S., and W. N. Pickles, M.B., B.S. Access—Aysgarth, ½ mile, via Northallerton, N.E.R., and Hawes Junction, M.R. See also p. 859

Banchory (Scotland).—*Nordrach-on-Dee*. Res. Phys., D. Lawson, M.A., M.D. Access—Banchory station, 1½ miles.

Barrasford (Northumberland).—*The Newcastle-on-Tyne and Northumberland Sanatorium*. Res. Med. Supt., Dr. Wm. B. Martin. Access—Barrasford, N.B.R., 4 miles.

Belbroughton (Wores.).—*Bourne Castle Sanatorium*. Res. Phys., W. Bernard Knobel, M.D. Access—Hagley, G.W.R.

Benenden (Kent).—*Sanatorium of "National Association for the Establishment and Maintenance of Sanatoria for Workers suffering from Tuberculosis."* Two Res. Med. Officers. Apply, Secretary. Access—Biddenden station, 3 miles.

Bingley (Yorks.).—*Eldwick Sanatorium* (school for phthisical children). Med. Off., Dr. Margaret S. Sharpe. Access—Bingley station, 2 miles.

Birmingham (near).—*Romsley Hill Home for Consumptives*, Halesowen. Med. Off., Dr. P. Allan.

Bolton (Lanes.).—*Wilkinson Sanatorium for Consumptives*, Sharples. Med. Off., Dr. J. D. Marshall.

Bournemouth.—*Royal National Sanatorium for Consumption and Diseases of Chest*. Sec., A. G. A. Major. Res. Phys., Dr. W. B. Parsons. Access—Bournemouth stat., 1 mile.

The Firs Home (for advanced cases). Hon. Sec., Dr. W. Willes, Bournemouth. Hon. Med. Offs., C. P. Woodstock, M.D., and S. G. Champion, M.D. Lady Supt., Miss Ingram. Access—Bournemouth Central, $\frac{1}{2}$ mile.

The Home Sanatorium, West Southbourne, near Bournemouth. Res. Med. Supt., J. E. Esslemont, M.B., Ch.B. Access—Bournemouth Central, $2\frac{1}{2}$ miles; Boscombe, $1\frac{1}{2}$ miles; Christchurch, $2\frac{1}{2}$ miles.

See also p. 859

Bridge of Weir (Renfrewshire).—*Consumption Sanatoria of Scotland*. Hon. Treas., Sir Joseph Maclay, Bart., 21, Bothwell Street, Glasgow. Med. Supt., James Crockett, M.D. Access—Bridge of Weir, 2 miles.

Brighton.—*Municipal Sanatorium*, for Brighton townfolk only (early and advanced cases). Med. Supt., Dr. Duncan Forbes, M.O.H. for Brighton. Particulars, Town Hall, Brighton.

Chagford (Devon).—*Dartmoor Sanatorium*. Res. Med. Supt., Dr. C. H. Berry. Access—Moretonhampstead, G.W.R., 6 miles.

Cheddar (Somerset).—*Engel Home* (for women and children). Med. Supt., R. W. Statham, M.R.C.S. Apply to Lady Supt. Access—Cheddar station, 15 minutes.

Chelmsford (Essex).—*Great Baddow Sanatorium*. Med. Supt., A. Lyster, M.D. Access—Chelmsford station, G.E.R.

Cheltenham.—*Cranham Lodge Sanatorium*, near Stroud. Res. Med. Supt., A. H. Hoffmann, M.D.

Sallerley Grange Sanatorium, near Cheltenham. Res. Med. Supt., Dr. E. G. Glover. Access—Leckhampton, $2\frac{1}{2}$ miles.

Chesterfield (Derbyshire).—*Ashover Sanatorium*. Med. Supt., Dr. Ida E. Fox. Access—Stretton, M.R., $3\frac{1}{2}$ miles.

Danbury (Essex).—*Alfred Boyd Memorial Sanatorium* (for ladies), Little Giberacks, Essex. Med. Supt., A. Lyster, M.D.

Darlington.—*Felia House*, Middleton St. George, Co. Durham. Res. Med. Supt., C. S. Steavenson, M.B. Access—Dinsdale, N.E.R., 5 minutes.

Devon and Cornwall Sanatorium, Didworthy, South Brent. For consumptive poor of the two counties. Sec., S. Carlile Davis, Esq., Law Chambers, Princess Square, Plymouth. Res. Med. Supt., Dr. W. B. Livermore. Access—Brent, G.W.R., 2 miles.

Doneraile (Co. Cork).—*Cork County and City Sanatorium*, Heatherside. Res. Med. Supt., Dr. R. Ahern. Access—Buttevant, G.S. & W.R., 5 miles.

Dublin.—*Peamount Sanatorium*, Hazelhatch, Dublin. Med. Supt., A. H. Hanley, C.M.G., F.R.C.S.I.

Dundee (near), Sidlaw Sanatorium. Med. Supt., H. E. Fraser, M.D., Royal Infirmary, Dundee. Access—Auchterhouse station, $1\frac{1}{2}$ miles.

Durham.—*Durham County Consumption Sanatoria*. Sec., Mr. F. Forrest, 54, John Street, Sunderland. For men: Stanhope, Med. Supt., Dr. John Gray. Access—Stanhope station, 1 mile. For women and children: Wolsingham, Med. Supt. Dr. Menzies. Access—Wolsingham station, $\frac{3}{4}$ mile.

Edinburgh.—*Royal Victoria Hospital for Consumption*. Under the Corporation of the City of Edinburgh, and the supervision of the Public Health Department, City Chambers, Edinburgh.

- Eversley (Hants).—Moorcote Sanatorium.** Res. Med. Supt., J. G. Garson, M.D. Access—Wellington College station, $4\frac{1}{2}$ miles; Wokingham station, 6 miles; Fleet, 6 miles.
- Farnham (Surrey).—Whitmead Sanatorium,** Tilford, near Farnham. Res. Phys., J. Hurd-Wood, M.D. Access—Farnham station, $3\frac{1}{2}$ mls.
- Fortbreda, Belfast.—Forster Green Hospital for Consumption and Chest Diseases.** Res. Phys., Dr. H. M. Jackson. Sec., J. Osborne, Scottish Provident Building, Belfast. Access—Belfast, 2 miles.
- Frimley (Surrey).—Brompton Hospital Sanatorium.** Res. Med. Supt., Dr. W. O. Meek. Access—Frimley station, 2 miles. See also p. 846
- Grange-over-Sands.—Westmoreland Sanatorium.** Res. Med. Supt., C. F. Walker, M.D. Access—Grange-over-Sands station, $2\frac{3}{4}$ miles.
- Hastings.—Fairlight Sanatorium,** in connection with Margaret Street Hospital for Consumption (for Out-Patients), 26, Margaret St., W. Sec., Mrs. M. C. Hawthorne. Med. Off., Dr. N. F. Stallard. Access—Hastings, tram, about 15 minutes.
- Heswall (Cheshire).—West Derby, Liverpool, and Toxteth Park Joint Sanatorium for Children.** Med. Supt., J. B. Yeoman, M.D. Matron Miss Bateson. Access—Heswall, $1\frac{1}{2}$ miles.
- Hull.—Hull and East Riding Convalescent Home,** Withernsea. Sec., Benjamin Brooks, Royal Infirmary, Hull. Med. Off., A. E. Sproule, L.R.C.P. Access—Withernsea stat.
- Isle of Wight.—Royal National Hospital for Consumption,** Ventnor. Senr. Res. Med. Off., Dr. James Watt. Sec., Charles W. Cox, 18, Buckingham Street, Strand, W.C. Access—Ventnor, 1 mile.
St. Catherine's Home, Ventnor (for early cases of phthisis in children). Apply Sister-in-Charge. Med. Off., H. F. Bassano, M.A., M.B. Access—Ventnor, 5 mins. drive.
- Kingussie, N.B.—Grampian Sanatorium.** Res. Med. Supt., W. de Watteville, M.D.
- Kinross-shire (Scotland).—Ochil Hills Sanatorium,** Milnathort. Res. Med. Supt., Dr. Ian Struthers Stewart. Access—Kinross junction, 4 miles.
- Kirkcaldy.—Sanatorium for Consumption.** Med. Supt., Dr. G. W. McIntosh. Sec., The Town Clerk. Access—Kirkcaldy, 1 mile.
- Lanark.—City of Glasgow Sanatorium,** Bellefield, Lanark. Res. Med. Supt., Dr. J. W. Allan. Access—Lanark, 20 minutes.
- Lanchester (Durham).—Maiden Law Sanatorium.** Med. Off., Dr. W. M. Morison. Sec., W. H. Ritson. Access—Annfield Plain sta., 1 mile.
- Leeds.—Leeds Sanatorium for Consumptives,** Gateforth, near Selby, and *Leeds Hospital for Consumptives,* Armley. For poor of Leeds. Sec., C. H. Sedgwick, 37, Great George St., Leeds.
- Liverpool.—Liverpool Sanatorium for Consumptives,** Kingswood, Frodsham. Sec., Liverpool Hospital for Consumption, Mount Pleasant, Liverpool. Acting Res. Physician, R. F. C. Talbot, M.D. Access—Frodsham, L. & N.W.R., $3\frac{1}{2}$ miles.
Park Hill Sanatorium, Liverpool. Med. Supt., H. R. Macintyre, M.D.
- Llanbyther (Carmarthenshire).—West Wales Sanatorium.** The Welsh National Memorial to King Edward VII. Res. Med. Supt., Dr. H. O. Blandford. Access—Llanbyther station, 3 miles.
- London.—City of London Hospital for Diseases of Chest,** Victoria Park, E. Res. Med. Off., Dr. Godfrey T. Hebert. Sec., Geo. Watts. Access—Cambridge Heath, G.E.R., 5 mins.
Mount Vernon Hospital for Consumption and Diseases of the Chest, Northwood. Access—Northwood (Met. & G.C. Rly.). Hon. Vis. and Res. Staff. Out-patient department, 7, Fitzroy Square, W. Secretary, W. J. Morton.
Royal Hospital for Diseases of the Chest, 231, City Road, E.C. Apply to the Secretary.
- Long Stratton (Norfolk).—Fritton Sanatorium.** Med. Director, Dr. Annie McCall, 165, Clapham Road, S.W. Access—Fornett station, G.E.R., 4 miles.

Manchester.—*Hospital for Consumption and Diseases of Throat and Chest*, Bowdon; *Crossley Sanatorium*, Delamere, Cheshire. (For poor and working classes, after personal examination at Manchester.) Sec., C. W. Hunt, Manchester. Res. Phys. (Bowdon), Dr. A. G. Bryce; (Delamere), G. Heathcote, L.R.C.P. & S.

Margate (Kent).—*Royal Sea-bathing Hospital* (for Surgical Tuberculosis). Sec., A. Nash, 13, Charing Cross, S.W. Access—Margate West, $\frac{1}{2}$ mile.

Mendip Hills.—*Mendip Hills Sanatorium*, Wells, Somerset. Res. Phys., D. J. Chowry Muthu, M.D. Access—Wells station, $2\frac{3}{4}$ miles.

See also p. 860

Nordrach-upon-Mendip, Blagdon, near Bristol. Res. Phys., R. Thurnam, M.D. Access—Burrington station, 5 miles.

Midhurst (Sussex).—*King Edward VII Sanatorium*. Res. Med. Supt., N. D. Bardswell, M.D. Access—Midhurst, 4 miles.

Nayland (Suffolk).—*East Anglian Sanatorium*, and *Mallings Farm Sanatorium* for poorer men and women patients. Med. Supt., Dr. Jane Walker, 122, Harley Street, W. Access—Bures station, G.E.R., $3\frac{1}{2}$ miles.

New Cumnock (Ayrshire).—*Ayrshire Sanatorium*, Glenafton. Res. Med. Supt., E. E. Prest, M.D. Access—New Cumnock, 3 miles.

Norfolk.—*Kelling Sanatorium*, Holt. Acting Med. Supt., Dr. W. J. Fanning. Access—Holt station, $1\frac{1}{2}$ miles.

Mundesley Sanatorium, Mundesley. Res. Phys., S. Vere Pearson, M.D. Access—Mundesley, 1 mile.

Northampton.—*Northamptonshire Sanatorium*, Creaton. Res. Med. Supt., Dr. J. A. Kilpatrick. Access—Brixworth, L. & N.W.R., 3 miles.

Nottingham.—*Ransom Sanatorium*, Sherwood Forest, Mansfield. Res. Med. Off., Dr. M. B. Murphy. Access—Mansfield, 3 miles.

Oban, Scotland.—*Argyll County Sanatorium*. Vis. Med. Off., Duncan MacDonald, M.D. Access—Oban, 1 mile.

Ockley (Surrey).—*Ockley Sanatorium*. Res. Phys., Dr. Clara Hind. Access—Ockley, L.B. & S.C.R., 1 mile.

Painswick, near Stroud (Glos.).—*Painswick Sanatorium*. Res. Phys. and Prop., W. McCall, M.D. Access—Stroud, 4 miles; Gloucester, 6 miles.

Peebles.—*Manor Valley Sanatorium*. Med. Off., C. B. Gunn, M.D.

Penmaenmawr (N. Wales).—*Nordrach in Wales, Pendyffryn Hall*. Res. Phys., Dr. G. Magill Dobson.

Peppard Common (Oxon).—*Berks. and Bucks. Joint Sanatorium*. Med. Supt., Dr. Esther Carling. Access—Reading, $6\frac{1}{2}$ miles.

Ringwood (Hants).—*Linford Sanatorium*. Res. Phys., H. G. Felkin, M.D., A. de W. Snowden, M.D., and H. A. F. Wilson, M.R.C.S. Access—Ringwood station, $2\frac{1}{2}$ miles.

Rudgwick (Sussex).—*Rudgwick Sanatorium*. Vis. London Phys., Dr. Annie McCall, 165, Clapham Road, S.W. Access—Rudgwick station, 5 minutes; Horsham stat., 7 miles.

Ruthin (N. Wales).—*Vale of Clwyd Sanatorium, Llambdr Hall*. Res. Prop., Dr. G. A. Creece-Calvert. Access—Ruthin station, 2 miles.

See also p. 859

St. Leonards.—*Eversfield Chest Hospital*, West Hill. Res. Phys., T. Gambier, M.D. Access—West St. Leonards, S.E.R., West Marina, L.B. and S.C.R., within 5 minutes, walk.

Sandon, near Chelmsford (Essex).—*Merivale Sanatorium*. Res. Phys., H. N. Marrett, M.R.C.S. Access—Chelmsford station, G.E.R., $3\frac{1}{2}$ miles.

Sheffield.—*City Hospitals for Consumptives*, Crimicar Lane (for males); Commonsidge (for females). Med. Supt., H. J. E. H. Williams, M.D.

Shirlett, near Broseley (Shropshire).—*King Edward VII Memorial Sanatorium*. Res. Med. Supt., Dr. T. R. Elliott. Access—Much Wenlock station, 3 miles.

Skipton (Yorks).—*Eastby Sanatorium*. Res. Med. Supt., Dr. Catharine Arnott. Access—Embsay station, 2 miles.

Stannington (Northumberland).—*"Philipson" Children's Sanatorium.* Matron, Miss S. M. Robson. Two Vis. Physicians. Access—Stannington station, 3 miles.

Threlkeld (Cumberland).—*Blencathra Sanatorium.* Res. Med. Supt., Dr. W. Goodechild. Access—Threlkeld, C.K. & P.R., 2 miles.

Torquay.—*Western Hospital for Incipient Consumption,* Torquay. Open Oct. to May. Sec., F. Manley. (Temporarily in use as a War Hospital.)

Warrenpoint (Co. Down).—*Rostrevor Sanatorium.* Res. Phys., B. H. Steede, M.D. Access—Warrenpoint. See also p. 860

Wicklow.—*The Royal National Hospital for Consumption for Ireland.* Newcastle, Wicklow. Res. Med. Off., Dr. Chas. D. Hanan. Access—D. & S.E.R. to Newcastle, Co. Wicklow, 3 miles.

Winsley, near Bath.—*Winsley Sanatorium.* Senr. Res. Med. Off., Dr. H. W. M. Rees. Sec., Frederic Jones. Access—Limply Stoke station, 1 mile.

Wokingham.—*Pinewood Sanatorium.* Res. Med. Supt., F. K. Etlinger, M.R.C.S. Access—Wellington College, S.E.R., 2 miles; or Wokingham, S.W.R., 3½ miles.

Worcester (near).—*Knightwick Sanatorium.* Res. Med. Supt., Dr. H. Gordon-Smith.

INSTITUTIONS FOR INEBRIATES.

LICENSED UNDER THE ACTS, 1879-1900.

The patient must sign a Form expressing a wish to enter the Home, before a magistrate. This can be done at the private residence of the patient, or at the retreat, if previous notice has been given. Two friends must also sign a declaration that they consider the patient an 'Inebriate' within the meaning of the Acts.

* NOTE:—Ashford is a Roman Catholic Religious Institution.

† Cinderford, Erdington, Home Hill, Terrington St. Clement, and Torquay are C.E.T.S. Institutions.

MALES ONLY.

Buntingford (Herts).—*Buntingford House Retreat.* Apply, Med. Supt. Access—Buntingford, G.E.R., 8 minutes.

Cinderford† (Glos.).—*Abbotswood House Inebriate Retreat.* Chaplain Supt., Rev. S. Scobell Lessey, M.D. Access—Ruspidge or Cinderford. See also p. 870

Cockermouth (Cumberland).—*Ghyllwoods.* Res. Med. Prop., Dr. J. W. Astley Cooper. Access—Cockermouth, 11 miles. See also p. xxxviii

Colinsburgh (Fife).—*Invernith Lodge.* Res. Med. Supt. and Licensee, Dr. W.H. Bryce. Access—Kilconquhar station, 4½ miles. See also p. 869

Folkestone.—*Capel Lodge,* near Folkestone. Res. Prop., E. Norton, M.D. Access—Folkestone Junc., 2 miles.

Rickmansworth (Herts).—*Dalrymple House.* Apply to Res. Med. Supt. Access—Rickmansworth station, Great Central & Metropolitan Railway, ½ mile; L. & N.W.R., 1 mile. See also p. 870

FEMALES ONLY.

Ashford, near Staines.*—Ecclesfield. Med. Supt., Dr. M. F. Cock. Apply, Mother Superior. Access—Ashford station, 1 mile. See also p. 870

Belfast.—*The Lodge Retreat,* Irwin Avenue, Strandtown. Med. Attendant, R. W. Leslie, M.D. Access—Bloomfield station, 5 minutes.

Beverley (E. Yorks).—*Albion House.* Med. Supt., Dr. George Savage. Hon. Sec., Mrs. T. R. Pentith, The Limes, Sutton-on-Hull.

Erdington, near Birmingham.†—*Corncreaves Lodge.* Lady Supt., Miss Knapman. Med. Off., Dr. Featherstone. Access—Gravelly Hill station, ¼ mile. See also p. 870

Fallowfield.—*The Grove Retreat,* near Manchester, Licensee, Mrs. Sam Gamble. Med. Offs., A. T. Wilkinson, M.D., J. W. Hamill, M.D., and Dr. Florence Robinson. Hon. Treas., Mr. Sam Gamble. Access—Fallowfield station, 10 minutes. See also p. 871

Herne Hill.†—*Ellison Lodge*, Half Moon Lane. Res. Supt., Miss Corner. Med. Supt., Dr. C. E. Finny. Access—Herne Hill, 10 minutes; North Dulwich, 3 mins. Telephone: 1162 Brixton.

See also p. 870

Leicester.—*Melbourne House*. Prop., Mr. H. M. Riley. Med. Attendant, R. Sevestre, M.A., M.D. Camb. London Consultant, W. Wynn Westcott, M.B. (Coroner N.E. London), 396, Camden Road, Holloway. Dublin Consultant, Sir Wm. J. Smyly, M.D., F.R.C.P.I., 58, Merrion Square, Dublin. Nat. Tel., 769 Leicester. Station, 2 miles.

See also p. 870

Newmains (N.B.).—*Newmains Retreat* for ladies. Access—Hartwood station, Cal. Railway, 2½ miles.

Reigate (Surrey).—*Duahurst*, for women of all classes. Under the Superintendence of Lady Henry Somerset. Med. Supt., A. Walters, M.R.C.S. Access—Reigate, 4 mls. *See also p. 871*

Spelthorne St. Mary (Bedfont, Middlesex).—Apply to the Sister Superior, C.S.M.V. Access—Feltham, S.W.R., 1 mile.

Terrington St. Clement† (Norfolk).—*Diamond Lodge*. Res. Supt., Miss Yolland. Med. Supt., S. R. Lister, M.R.C.S. Access—Terrington station, 1½ miles. *See also p. 870*

Torquay.†—*Temple Lodge*. Res. Supt., Sister in Charge. Med. Off., W. Odell, F.R.C.S. Hon. Sec., Mrs. H. Erskine. *See also p. 870*

REFORMATORIES CERTIFIED UNDER THE INEBRIATES

ACT, 1898.

MALE AND FEMALE.

Bristol.—*Brentry Certified Inebriate Reformatory*, Westbury-on-Trym. Res. Supt., Capt. Lay; Med. Off., Dr. Ormerod. Hon. Sec., Rev. H. N. Burden. Access—Clifton Down, Redland, or Patchway stat., 3½ mls.

FEMALES ONLY.

Langho (Lancashire).—*Lancashire Inebriate Reformatory*, Langho, near Blackburn. For Lancashire cases. Res. Supt. and Med. Off., Dr. F. A. Gill. Access—Langho station, 1½ miles.

UNLICENSED HOMES.

Beckenham (Kent).—*Norwood Sanatorium*, The Mansion, Beckenham Park. Med. Supt., F. Hare, M.D. Access—Beckenham Junc. station, 10 minutes. *See also p. 871*

Dublin.—*Farnham House*, Finglas. Res. Med. Supt., H. P. D'Arcy Benson, M.D. Access—Dublin, 2 miles. *See also p. 887*

Hounslow (Middlesex).—*West Holme*, for middle-class and working

women. Med. Supt., Dr. G. A. S. Gordon. Access—S.W. & Dist. Rly., ¼ mile.

London.—*London Sanatorium*, 150, Harley Street, W. Res. Med. Supt., C. A. McBride, M.D.

See also p. 871

Maldon (Essex).—*Osea Island* (for ladies and gentlemen). Vis. Phys., H. I. Price, F.R.C.S. Prop., F. N. Charrington, Esq.

HYDROPATHIC ESTABLISHMENTS.

Ben Rhydding (Yorkshire).—*Ben Rhydding Hydro.* Phys., Dr. F. J. Stansfield and Dr. W. R. Bates. Access—Station, a few hundred yards.

Birmingham.—*The City Hydropathic and Massage Establishment*, 275, Broad Street. Proprietor, Robert Schenkel (*Swiss*). See also p. 856

Bournemouth (Hampshire).—*Bournemouth Hydropathic.* Res. Phys., W. J. Smyth, M.D. Access—East station, $1\frac{1}{2}$ miles; West station, $\frac{1}{4}$ mile.

Bristol.—*The Bristol Hydropathic* College Green. Res. Phys., W. J. Spoor, M.B., M.R.C.S. Access—Temple Meads, $1\frac{1}{4}$ miles.

Bute.—*Kyles of Bute Hydropathic*, Port Bannatyne, Rothesay. Man., A. Menzies. Med. Supt., Dr. A. J. Hall. Access—Clyde steamers call daily.

Buxton.—*Buxton Hydro Hotel.* Manager, G. W. Bosworth. Access—Station, 4 minutes.

Caterham (Surrey).—*Caterham Sanitarium and Surrey Hills Hydropathic.* Res. Med. Supt., A. B. Olsen, M.D. Access—Caterham station. See also p. 868

Clifton (near Bristol).—*Clifton Grand Spa and Hydropathic.* Access—Clifton Down station, 1 mile; Bristol station, $1\frac{1}{2}$ miles.

Cork.—*St. Ann's Hill Hydropathic.* Res. Med. Supt., Dr. R. H. Barter. Access—Blarney station, $2\frac{1}{2}$ miles; Muskerry Light Railway from Cork, 8 miles.

Crieff.—*Strathearn Hydro* (17 miles from Perth). Res. Med. Supt., T. Gordon Meikle, M.B., C.M. Access—Crieff station, 1 mile.

Eastbourne.—*Eastbourne Hydropathic.* Manager, W. J. Grimes. Access—Eastbourne stat., 5 mins.' drive.

Edinburgh.—*Hydropathic*, Slateford. Man. Director, J. Bell. Access—Merchiston, 1 mile; Waverley, 3 miles.

Forres.—*Cluny Hill Hydropathic.* Vis. Phys., Dr. John Adam. Access—Forres station, 1 mile; Inverness, 24 miles.

Grange-over-Sands.—*Hazlewood Hydropathic.* Access—Carnforth, L. & N.W.R., then by Furness Railway; Grange-over-Sands, $\frac{1}{4}$ mile.

Harrogate (Yorkshire).—*The Cairn Hydropathic.* Man., Mrs. Baker. Access—Harrogate station, $\frac{1}{2}$ mile.

Harlow Manor Hydro. Man., Miss Oakley.

The Harrogate Hydropathic Lim. Phys., Dr. T. Johnstone. Man., W. Taylor. Access—Harrogate station, $\frac{1}{2}$ mile.

Harrogate Imperial Hydro. Man., Miss Hemingway.

Hexham (Northumberland).—*Tynedale Hydropathic.* Prop., F. G. Grant. Med. Supt., Dr. D. Stewart. Access—Hexham, 1 mile; Newcastle, 19 miles.

Ilfracombe.—*The Cliffe Hydro.* Med. Supt., Chas. W. E. Toller, M.D. Apply to the Secretary. Station, 1 mile. See also p. xxxviii

Ilkley (Yorkshire).—*Craiglands Hydro, Lim.* Res. Physicians, Henry Dobson, M.D., C.M. (Edin.), and Maurice R. Dobson, M.B., B.S. (Lond.), L.R.C.P., M.R.C.S. (Eng.). See also p. 864

The Spa Hydro. Hotel, Ilkley, Manager, J. S. Brodie. Vis. Phys., Dr. Henry Veale. Access—Ikley, 3 minutes.

Limpley Stoke (near Bath).—*West of England Hydropathic.* Access—Limpley Stoke station. Apply, the Secretary.

Malvern.—*The Malvern Hydropathic.* Res. Prop., J. C. Fergusson, M.D. Access—Great Malvern station, $\frac{1}{4}$ mile.

Wyche-side Hydropathic. Access—Malvern Wells station, G.W.R., $\frac{1}{2}$ mile; Great Malvern station, 2 miles.

Matlock.—*Rockside Hydropathic*, Matlock. Med. Supts., Drs. Marie Goodwin (Resident) and Dr. Morton. Access—Matlock, $\frac{1}{4}$ mile.

Royal Hotel and Baths, Matlock Bath. Phys., W. C. Sharpe, M.D. Access—Matlock Bath station.

Smedley's Hydropathic, Matlock. Res. and Vis. Physicians. Access—Matlock station, $\frac{1}{2}$ mile; omnibus. See also p. 862

Moffat.—*The Moffat Hydropathic*. Man., Miss Gardner. Med. Supt., Dr. D. Huskie. Access—Moffat station, 1 mile.

Peebles.—*Peebles Hotel Hydropathic*. Complete modern equipment of baths and electrical treatment. Plombières treatment for mucous colitis. Fango di Battaglia (mud packs for sciatica, etc.). Res. Phys., Thomas D. Luke, M.D., F.R.C.S. Edin. Access—N.B. and

Cal. stations about 10 to 15 mins. walk. See also p. 863

Shandon.—*Shandon Hydropathic*. Consulting Phys., Dr. Wm. R. Sewell. Access—Shandon, 5 mins.

Southport (Birkdale Park).—*Smedley Hydropathic*. Phys., J. G. G. Corkhill, M.D. Southport or Birkdale stations. See also p. 860

Kenworthy's Hydropathic, Southport. Res. Phys., Dr. Kenworthy. Access—Chapel Street (L. & Y.), Lord St. station (Cheshire Lines), $\frac{1}{4}$ mile. Telephone: 80. Telegrams: "Kenworthy's, Southport." See also p. 860

Tunbridge Wells.—*The Spa*. Access—Station, about 1 mile; London, 34 miles. Apply, Manager.

Ulverston.—*Conishead Priory Hydropathic*. Visiting Physician, Dr. R. Ashburner. Access—Ulverston station, $1\frac{1}{2}$ miles.

NURSING INSTITUTIONS AND PRIVATE HOMES FOR INVALIDS.

NURSING INSTITUTIONS.

Leeds.—*Leeds Trained Nurses' Institution*, 21, Hyde Terrace, Leeds. Apply Superintendent. Tel. 177. Telegrams: "Expert, Leeds."

See also p. 855

London.—*Associated Male Nurses and Masseurs* (Trained at The National Hospital), 36, Grafton Rd., Acton. W. Secretary, A. Sharman.

See also p. 852

Co-operation of Temperance Male and Female Nurses, 60, Weymouth Street, W. Secretary, M. Sullivan.

See also p. 852

Male Nurses' Association, 29, York Street, Baker Street, W. Sec., W. J. Hicks. See also p. 853

Mental Nurses' Co-operation, 49, Norfolk Square, W. Lady Supt. Miss Jean Hastie. Access—Paddington, 7 minutes. See also p. 850

National Temperance Male and Female Nurses' Association, 27, Cambridge Gardens, W. Sec., R. H. McKie. See also p. 855

St. Luke's Hospital, Old Street, E.C. Trained Nurses for Mental and Nervous Cases. Apply Matron. See also p. 850

Temperance Male Nurses' Co-operation, Ltd., 43, New Cavendish Street, W.; also at Manchester, Glasgow, and Dublin. Secretary, M. D. Gold. See also p. xxxiv.

The Nurses' Association, 29, York Street, Baker Street, W. Lady Supt., Mrs. Millicent Hicks. See also p. 853

York.—*The Retreat* (Trained Nurses' Department, for mental and nervous cases only). See also p. 882

PRIVATE HOMES FOR INVALIDS, MATERNITY HOMES,
INSTITUTIONS FOR SPECIAL TREATMENTS, Etc.

Alderley Edge (Cheshire).—*The David Lewis Colony* (for Sane Epileptics), and *Colthurst House School* (for epileptic boys). Director, Alan McDougall, M.D. Access—Warrford, near Alderley Edge, Cheshire.

See also p. 858

Alresford (Hants).—*Beaucorth Manor*. Invalids, any cases except insanity. Apply Superintendent.

See also p. 856

Bath.—*Lansdown Hospital and Nursing Home*, Bath (invalids only; special arrangements for patients suffering from gout, rheumatism, and physical infirmities). Med. Supts., Dr. Percy Wilde and Dr. Wells-Beville. Access—M. or G.W. stations, 1 mile. *See also p. 850*

Billericay (Essex).—*New Lodge*, and *Leon House*. For epilepsy and mental deficiency. Med. Off., W. Shackleton, M.D. Access—Billericay, 1 mile. *See also p. 858*

Bristol.—*Sunshine House*, Brynland Avenue, Bristol (for maternity cases only). Apply, Nurse.

See also p. 851

Church Stretton (Salop).—*Church Stretton Nursing Home*, "Ashford House." Apply, Misses Nicholls and Silverlock. *See also p. 856*

Edinburgh.—*Queensberry Lodge*, for ladies. Supt., A. Miller. Med. Supt., Dr. William Russell. Access—Waverley station, $\frac{1}{2}$ mile.

See also p. 854

Guildford.—*Kia-Ora Nursing Home*, 14, Stoke Road. Medical, surgical, maternity, and rest cure patients. Principal, Miss Wilcox.

See also p. 848

Hadlow Down, Buxted (Sussex).—*South Beacon* (for the care and treatment of gentlemen mentally affected, but not ill enough to be certified). Prop., Philip H. Harmer. Access—Buxted, 3 miles; Mayfield, 4 miles; Heathfield, 4 miles.

See also p. 857

Jedburgh.—*Abbey Green* (for Invalids and War Convalescents). Res. Prop., Wm. Blair, M.D. Access—N.B.R., Jedburgh. Telephone: No. 3.

See also p. 856

London.—*Faraday House*, 85, West Side, Clapham Common, S.W. Medical, electricity, radiant heat, radium, Weir Mitchell, and Nauheim treatment. Apply Secretary.

See also p. 855

Radium Institute, 16, Riding House Street, W. Med. Supt., A. B. Hayward Pinch, F.R.C.S.

See also p. 855

St. Andrew's Hospital, Dollis Hill, N.W. Res. Med. Supt., E. Newlyn Smith, M.D. Access—Brondesbury, Metropolitan Railway station.

See also p. 851

St. Thomas's Home, St. Thomas's Hospital, Westminster Bridge. Apply, The Steward, St. Thomas's Hospital, S.E. Access—Waterloo, 5 minutes. Tel.: Hop. 1637.

See also p. 854

New Brighton.—*Convalescent Home for Women and Children*. Hon. Sec. and Treas., Frank Holt, Esq., 8, Cook Street, Liverpool. Lady Supt., Miss K. R. Bolton.

See also p. 854

Peebles, N.B.—*St. Roman's* (for two or three mild mental cases). Med. Supt., Thomas D. Luke, M.D. Access—Peebles, $\frac{1}{2}$ mile.

See also p. 857

Ryde, I.W.—*St. Luke's Home* for epileptic churchwomen, Ryde, I.W. Med. Supt., S. Churchill, M.A., M.B. (Cantab.). Address, Deaconess.

See also p. 858

Tunbridge Wells.—*Mount Ephraim Nursing Home*, 8, Molyneux Park. Medical, surgical, Weir-Mitchell, and massage cases. Excellent facilities for open-air treatment. Apply, Miss Baxter. Access—S.E. & Chatham Station, 10 mins.

See also p. 856

PRINCIPAL BRITISH SPAS,

WITH INDICATIONS FOR THEIR THERAPEUTICAL EMPLOYMENT.

Revised by N. ILLY FORBES, F.R.C.S. Edin., F.R.S. Edin. (Church Stretton).

Bath (Somerset).—Sheltered from the N. and N.E. winds by a range of hills from 600 to 800 feet high; 2 hours from London (Paddington), 12 miles from Bristol. Rainfall, 32·7 inches in 1914, and sunshine, 1666 hours. Climate mild and equable.

Waters.—The only hot springs, and the only winter spa, in Great Britain. Three springs yield over half a million gallons of water daily; the temperature of the hottest is 120° F. The waters contain sulphates of calcium, strontium, sodium, and potassium, with calcium carbonate, the chlorides of magnesium, sodium, and lithium.

Therapeutic indications.—Gout, chronic rheumatism, rheumatoid arthritis, sciatica, disorders of the digestive organs, anæmia, skin diseases, functional nervous disorders and debility.

Baths.—Modern baths of every description, including Aix douche massage, deep baths, electric, water and hot air, natural vapour, needle, intestinal douches for muco-membranous colitis and allied conditions, sulphur, Nauheim, and Zander medico-mechanical treatment.

Nursing and Baths.—Lansdown Grove House (*See p. 850*).

Massage and Electricity.—Percival C. Cottle, 12, Paragon, Bath (*See p. 858*).

Bridge of Allan (Stirlingshire).—422 miles from London, 3 miles north of Stirling. Sheltered from the north and east winds by the Ochil Hills. On the direct route to London, and within an hour's rail journey of Edinburgh and Glasgow. Average rainfall 33·24 inches. Climate mild and equable all the year.

Waters.—Natural mineral waters from six springs (Airthrey), at a depth of about 116 feet, exceedingly rich in saline, the chief ingredients being various salts of calcium, sodium, and magnesium. These waters are once more coming into great prominence.

Therapeutic indications.—Chronic affections of the liver, stomach, and bowels, in many chest diseases, and in rheumatism, gout, sciatica, and other nerve affections, also in some diseases of the skin.

Baths.—Excellent suite of baths, with skilled attendants.

Buxton (Derbyshire) (*See also p. 867*).—The Mountain Spa, 1000 feet above sea level, 3½ hours from London (St. Pancras), 23 miles from Manchester, 30 from Sheffield, 53 from Liverpool. Bracing climate. Rainfall, 52·7 inches in 1915, and 1078 hours of sunshine. Lowest absolute humidity of any health resort in Great Britain.

Waters.—Thermal springs 82° F. Powerful radio-active properties. More highly charged with nitrogen gas than any other spring. Chalybeate spring, rich in protocarbonate of iron.

Therapeutic indications.—Gout, rheumatism, rheumatoid arthritis, sciatica, nervous diseases, skin diseases, especially those of gouty origin, malaria and other tropical diseases, colitis, anæmia, phlebitis, and diseases of women.

Baths.—Over 90 different treatments. Every proved treatment installed. Recent official report of Devonshire Hospital gives percentage of cures as 88·6 per cent extending over last five years. (*See also p. 867*.)

Boarding Establishment.—The Buckingham Boarding Establishment (*See p. 868*).

Cheltenham (Gloucestershire).—184 feet above sea level, 3 hours from London. Rainfall, 27·5 inches in 1914, and sunshine, 1576 hours. Town very free from fogs. Protected from N. and N.E. winds. Good water supply and modern sanitation.

Waters.—The mineral waters are of two kinds. One is alkaline (Pittville) from contained sodium carbonate, the only one of this type in Great Britain. The other is impregnated with the sulphates of soda and magnesia. They are now receiving considerable attention from the medical profession, and seem likely to successfully compete with Carlsbad, Marienbad, and Vichy in attracting a portion of the patients formerly sent abroad.

Therapeutic indications.—Gout, dyspepsia, metabolic disorders generally, chronic gastric and hepatic troubles, and neurasthenia.

Baths.—Good modern baths, with massage.

Church Stretton (Salop).—613 feet above sea level, in the 'Highlands of England,' 4½ hours from Euston, 3¼ hours from Paddington, 1½ hours from Birmingham, 2½ hours from Liverpool and Manchester, and 2½ hours from Bristol. Air noted for its extreme purity, bracing, with a somewhat tranquillizing influence, and a generally invigorating climate. Hills 1250 to 1700 feet high. Prevailing wind, S.W. Rainfall, 35.18 inches in 1914. Modern drainage. Porous soil.

Waters.—Said to be the purest in Great Britain. Found to be useful in gout, rheumatism, chronic renal affections, arterio-sclerosis, and gastric catarrh.

Therapeutic indications.—Specially the 'open-air' cure of neurasthenia, for sequelæ of influenza, for insomnia, functional nervous diseases, chronic gout and rheumatism, chronic gastric and bronchial catarrh, debility from over-work, and convalescence after illness or operation. 'Terrain cure,' and special physical exercises for obesity, myocardial atony, early arteriosclerosis, hepatic inadequacy and constipation. A good 'after-cure' resort from Bath, Buxton, Cheltenham, Droitwich, Leamington, and Llandrindod Wells.

Nursing.—"Ashford House," Church Stretton Nursing Home (See p. 856).

Droitwich (Worcestershire) (See also p. 866).—150 feet above sea level, 2½ hours from London (Paddington), 19 miles from Birmingham, 6 from Worcester. Rainfall about 23 inches. Mean winter temperature 47° F., summer 69.9° F. Well protected from N. and N.E. winds.

Waters.—The most powerful saline in the world. The brine is pumped from 200 feet below the ground level. Temperature 54° F., and is heated by introducing steam. It is 10 to 12 times as strong as that of the ocean (Channel), containing in every gallon 20,000 grains of saline in excess of any known waters: the waters possess radio-active properties.

Therapeutic indications.—Chronic muscular and articular rheumatism, rheumatoid arthritis, chronic articular or irregular gout, neuritis, sciatica, neuralgia, heart diseases, especially those of myocardium—effect similar and equal to Nauheim treatment—neurasthenia, anæmia, chlorosis, some sclerotic diseases of spinal cord, dry, scaly skin diseases, e.g., chronic eczema and psoriasis.

Baths.—Immersion, douche, needle, vapour, swimming, Aix-douche, Nauheim baths, etc.

Hotel.—Worcestershire Brine Baths Hotel, and Brine Baths (See p. 866).

Harrogate (Yorkshire). (See also p. 865).—450 feet above sea level, 4 hours from London, 18 miles from Leeds. Unequalled by any Continental spa, especially for the treatment of gout and its complications. The climate is stimulating and fairly dry—bracing moorland air. Rainfall in 1914, 31.22 inches, and sunshine, 1468 hours.

Waters.—Celebrated for the medicinal properties of its 87 springs—sulphurous, chalybeate, alkaline, and saline. 'Aquaperia' aperient mineral water is bottled at Harrogate by Camwal Ltd. (See p. 795).

Therapeutic indications.—Anæmia, chlorosis, gout, rheumatism, disorders of liver and stomach, muco-membranous colitis, chronic appendicitis, and skin diseases.

Baths.—There are four establishments, where nearly 70 treatments are given, including sulphur baths, douche, Nauheim, vapour, Russian, Turkish, electric, mineral, electric light, ozone, throat and nasal (*See also p. 865*).

Ilkley (Yorkshire).—Situated on the southern slope of the valley of the Wharfe, rising rapidly from the bank of the river to a height of 1320 feet above sea level. Occupying a sheltered position. Annual rainfall, about 32 inches. Mean annual temperature 48° F. Death-rate 8 per 1000. Being close to extensive moors the air is bracing and exhilarating and at the same time dry and soft, having a wonderfully restorative effect upon invalids as well as on Anglo-Indians, delicate children, and convalescents.

Waters.—The water supply obtained from springs is remarkably pure, bright and sparkling. Chalybeate waters. Saline.

Therapeutic indications.—Gout, rheumatism, neuritis, neurasthenia, anemia, asthma, and bronchitis cases are benefited. The treatment adopted is that known as hydro-therapeutic.

Baths.—Complete suites of baths are to be found in the numerous establishments. Electrical, Weir-Mitchell.

Hydropathic Establishment.—Craiglands Hydropathic (*See p. 864*).

Leamington Spa (Warwickshire) (*See also p. xxxv.*)—195 feet above sea level, 1 hour 30 minutes from London (Paddington or Euston), 24 miles from Birmingham. Equable and mild climate, with low rainfall, 24.6 inches in 1914, total bright sunshine 1495 hours. Westerly winds prevail.

Waters.—Saline, resembling those of Homburg, but more generally useful.

Therapeutic indications.—Muscular and articular rheumatism, gout, rheumatoid arthritis, neuralgia and neuritis, diseases arising from a plethoric condition of the chylipoietic viscera, eczema and other irritative disorders of the skin, conditions of increased vascular tension and chronic interstitial nephritis.

Baths.—Turkish, medicated, swimming, and electric of all kinds (*See also p. xxxv.*).

Llandrindod Wells (Radnorshire).—Situated in Central Wales, at an altitude of 750 feet. About 5 hours from London. It lies in the centre of a plateau of hills rising in places to over 2000 feet. Sheltered from the east, and open to the south and west. The soil is porous, and dries up quickly after rain. The climate is extremely bracing. Rainfall, 41.11 inches in 1913.

Waters.—There is a great variety of mineral waters—saline, sulphurous, iron, magnesium, chloride of calcium, and lithia springs similar in composition to those at Kissingen and Homburg. Slightly aperient and strongly diuretic.

Therapeutic indications.—The diseases most benefited are those in which any digestive derangements are present, the various forms of gout and rheumatism, rheumatoid arthritis, neuritis and fibrositis, gall-stones and biliary stasis, renal calculus, or any kidney or bladder condition requiring diuresis, and in neurasthenia, or debility from over-work or convalescence.

Hotel.—The Montpellier Hotel (*See p. 865*).

Llangammarch Wells (Breconshire).—In an open valley surrounded by moorland, 600 feet above sea level. 5½ hours from London. Mean annual temperature in 1914, 48.1° F. Sunshine in 1914, 1320 hours, and rainfall 58.6 inches in 1914. Well protected from the east, and prevailing wind is S.W.

Water.—Saline, containing the chlorides of barium (6½ grains per gallon), calcium, magnesium, lithium, and sodium; the only one of its kind in the British Isles. The barium salt has a physiological action on cardiac muscle similar to that of digitalis and strophanthus, and is also a good diuretic. Administered both internally and externally. Temperature 56° F.; is heated for bathing purposes. A modified Nauheim system of baths (immersion, douche, and needle), exercises, massage, and hill climbing is carried out.

Therapeutic indications.—Cardiac diseases, organic and inorganic, especially affections of the myocardium due to influenza. Graves's disease, chronic muscular and articular rheumatism, osteo-arthritis, gout, sciatica, and neurasthenia.

Malvern (Worcestershire).—Situated at an altitude of 520 feet above sea level, on eastern slope of Malvern Hills (9 miles long and rising to 1400 ft.), 2½ hours from London (Paddington), and about 1 hour from Birmingham. Original home of hydropathy. Soil gravelly (syenitic detritus). Air dry and bracing, cool in summer and warm in winter. Rainfall, 30 inches in 1914. Mean annual temperature 50·6° with low daily variation, daily mean of bright sunshine in 1914, 4·47 hours. Total sunshine in 1914 1631 hours. Lowest death-rate of any inland watering-place. Sanitation perfect.

Waters.—Mainly spring, of remarkable purity, free from organic matter, less than 4 grains of earthy salts per gallon. W. & J. Burrow's Malvern Waters (*See p. 916*).

Therapeutic indications.—Gout, rheumatism, rheumatoid arthritis, neuralgia, sciatica, lumbago, dyspepsia, constipation, anaemia, bronchial nephritic, and cutaneous diseases.

Baths.—Natural pure brine (from Droitwich), Turkish and electric baths, Vichy massage and Aix douches, Fango-di-Battaglia.

Matlock Bath (Derbyshire).—300 to 800 ft. above sea level, 3½ hours from London (St. Pancras), 46 miles from Manchester, 16 from Derby. Rainfall in 1914, 35·0 inches, and sunshine, 1321 hours. Very sheltered.

Waters.—Thermal Springs. Mild sulphated alkaline—saline waters at 68° F., containing 33 grains per gallon of salts, mainly magnesium and calcium bicarbonate, and magnesium sulphate. Owing to their peculiarly soft and unctuous character they are especially valuable in bathing and douche operations, particularly those associated with massage, such as the 'Aix' and 'Vichy' douches.

Therapeutic indications.—Rheumatism, gout, rheumatoid arthritis, neuritis, neurasthenia, catarrhs (bronchial, gastric, or enteric), anaemia, cardiac asthenia, chronic diseases of the liver or kidneys, digestive and biliary disorders.

Baths.—A complete modern installation exists for the administration of all kinds of baths, douches, packs, and other hydropathic treatment, electricity, massage, inhalations, Nauheim baths, with Swedish exercises.

Fango-di-Battaglia.—The volcanic mineral deposit from the hot springs near Padua (N. Italy) is imported, and extensively used in the treatment of gout, rheumatoid arthritis, and neuritis.

Matlock Bank (Matlock station, one mile by rail from Matlock Bath).—300 to 800 feet above sea level, 3½ hours from London (St. Pancras), 45 miles from Manchester, 17 from Derby. South-westerly aspect, and well sheltered from the north. Climate mildly bracing. Sunshine above the average. The Matlock system of hydropathic treatment is carried out in all its branches, and the principal Hydros are installed with latest electric baths and appliances, including high-frequency, Dowsing radiant heat and light. Schnee four-cell, x rays, etc. They also include Turkish, Russian, plunge, medicated and inhalation baths, 'Aix and Vichy douches.

A feature of the Matlock Hydros is that, as a rule, they are complete in their own grounds, and contain croquet and tennis lawns, and bowling and putting greens, which, as a means of recreation and exercise, form a valuable auxiliary to a course of hydropathic treatment.

Hydropathic Establishments.—Smedley's Hydropathic (*See p. 862*).

Peebles (Peebleshire, N.B.).—500 ft. above sea level. One hour from Edinburgh and 8 from London (via Galashiels). Rainfall, 27 inches. Bracing climate, but sheltered from the north winds. Mean annual mortality rate 11 per mil. Population 6000 in winter, and 10,000 in summer.

Waters.—The waters are of the halothermal type, similar to Kissingen and Kreuznach. The chief ingredient is chloride of sodium. They are obtained from the famous St. Ronan's Well (6 miles east).

Therapeutic indications.—The waters are specially suited to the Nauheim and Bourbon Lancy treatment of cardiac disease, and in this respect seem likely to compete with the above-mentioned continental resorts, patients being saved the long journey, and also, after the baths, are conveyed by lift immediately to their rooms for resting. The waters are also suited to dyspepsia, gout, rheumatism and neurasthenia.

Baths.—The baths at the hydropathic are of the most modern type. Complete electrical installation and mud baths (Fango-di-Battaglia).

Hydropathic Establishment.—Peebles Hotel Hydropathic (See p. 863).

Nursing Home.—St. Ronan's, Peebles (See p. 857).

Ripon (Yorkshire) (See also p. 864).—Situated on rising ground near the junction of the Rivers Ure and Skell. On the N.E. Railway, 4½ hours from London. 120 feet above sea level. Climate mild but bracing. Soil, gravel and sand, and dries quickly after rain. Prevailing winds, W. and S.W. Surrounding country well wooded and very beautiful, Fountains Abbey and many other places of interest are within easy reach. The Yorkshire Moors are only a few miles from the City.

Waters.—Saline Sulphur Water brought down from Aldfield Spa, 4 miles distant, to the New Baths erected in 1904.

Therapeutic indications.—Chronic and subacute gout, rheumatism, rheumatoid arthritis, chronic skin diseases (eczema, psoriasis, acne), catarrhs, gastric and liver derangements.

The Baths have been lately equipped with up-to-date electric apparatus. (See also p. 864).

Strathpeffer Spa (Ross-shire, N.B.).—In the Highlands of Scotland. 180 to 300 feet above sea level. Sheltered from N. and N.E. winds. Prevailing wind S.W. Sandy soil. Bracing air. Sunshine in 1914, 1167 hours, and rainfall, 30 inches.

Waters.—Sulphurous and chalybeate. Former, very rich in sulphuretted hydrogen gas and sulphates. Four sulphur wells in use: (1) Old well; (2) Upper; (3) Strong; (4) Cromartie. No. 4 contains over 19 cubic inches H_2S to gallon. Sulphates, the predominating salt. Have strong diuretic and mild aperient action.

Therapeutic indications.—Chronic and subacute gout and rheumatism (especially articular), rheumatoid arthritis, chronic skin diseases (eczema, acne, psoriasis), especially when gouty or rheumatic, chronic disorders of the digestive system, chronic gastric or intestinal catarrh, sluggish portal circulation, congested liver, biliary and urinary calculi, neurasthenia, anaemia, obesity, chronic metallic poisoning, dilatation of heart, neuritis.

Baths.—Sulphurous (immersion), inhalation, peat, douche (Aix and Vichy), needle, pine, Russian, Nauheim, radiant heat (electric), and high-frequency current.

Trefriw Wells (Carnarvonshire).—A chalybeate spa in the Conway valley, one mile from Llanrwst station (L. & N.W.Ry.); 5 hours by rail from London. The climate is bracing, the air soft, pure, and mostly of a westerly or south-westerly type; it is recommended for the convalescent and the neurasthenic.

Waters.—Two varieties: (1) The aluminous chalybeate, and (2) the sulpho-magnesian chalybeate; the former contains 4.36 grains per ounce of crystalline ferrous sulphate, and the latter 1.95 grains per ounce of the same salt. Used internally, and externally in the form of baths.

Therapeutic Indications.—All those morbid conditions in which iron is indicated; conditions which, as a rule, mainly depend on some degenerative or destructive changes in the blood. For the so-called 'metabolic' diseases, which chiefly consist in some digestive inefficiency, some incomplete elimination of food-toxins and other various waste products, and

some defective blood-formation. Useful in certain chronic skin diseases e.g., psoriasis, eczema, acne, and impetigo. Also suitable for the anæmia of 'granular kidney,' for some types of chronic catarrhal disease of mucous membranes, and for the usual forms of round-worm and tape-worm. The initial doses are small, usually from 2 or 3 teaspoonfuls to one or two tablespoonfuls gradually increased, being taken from first to last under strict medical supervision.

Tunbridge Wells (Kent).—400 feet above sea level, 1 hour from London (Charing Cross, S.E.C.R.), 30 miles from Hastings. Mean winter temperature 41.3° F., summer 55.9° F. Lies upon a bed of sandstone. Climate is tonic and invigorating. Prevailing winds W. and S.W.

Water.—A weak non-aerated, chalybeate spring, containing 4 grains ferrous carbonate to the gallon, with sulphates and chlorides of potash, soda, and calcium.

Therapeutic indications.—(Climatic) diseases of respiratory organs (bronchitis, asthma, and phthisis), early cardiac cases, diseases of digestive organs, gout and rheumatoid arthritis, and especially diseases of nervous system (neurasthenia and mental depression), also in convalescence and some infantile disorders. Waters indicated in anæmia, chlorosis, and allied conditions.

Baths.—Immersion, douche, needle, Turkish, Russian, vapour and swimming, medicated and electric light.

Nursing.—Mount Ephraim Nursing Home (*See p. 856*).

Woodhall Spa (Lincolnshire) (*See also p. 867*).—Built upon ironstone sand, through which the rain percolates very rapidly. Midway between Boston and Lincoln, about 3 hours from London (King's Cross). Average rainfall, 22½ inches. Air bracing, and uncontaminated, from moors and pine woods. Excellent new water supply.

Waters.—Bromo-iodine waters, rich in the chlorides of sodium, calcium, and magnesium, with bromine and iodine.

Therapeutic indications.—Rheumatism (chronic articular and muscular), lumbago, arthritis deformans, gouty arthritis, sciatica, neuritis, paralysis, neurasthenia; injuries to joints; skin diseases, psoriasis, urticaria; diseases peculiar to women; diseases of throat and nose; liver disorders.

Spa Baths.—Recently enlarged. Immersion, shower, undercurrent and local douches; Aix and Vichy douche massage; Nauheim, electric and Schnee baths; Dowsing radiant heat and light baths; Bergonie treatment; nose, throat and eye mineral sprays and douches; Russian and Berthollet vapour; electric ionic and x-ray treatments; massage and Swedish exercises. Particulars, apply Medical Superintendent.

Hotel.—Victoria Hotel (*See p. 867*).

Helouan, Egypt.—Sixteen miles from Cairo by train, 200 feet above the Nile, which is about three miles from the town. Celebrated for its wonderfully dry, warm, and yet bracing climate, the amount of sunshine in the winter months, and its convenient position for seeing many of the antiquities of Egypt. The amount of bright sunshine from November to March averages 8.3 hours a day, as against 1.4 in London. The diurnal variations are small, the air is fresh by day and night and very free from dust. The average annual rainfall is about $\frac{3}{4}$ of an inch.

Waters.—Strong sulphur waters, which are used internally and externally in various ways, but especially in the Helouan Bath (New Bath Establishment), in which massage is given while a stream of water at the desired temperature passes freely through the bath. This water rises at a temperature of 91° F.

Therapeutic indications.—Gout, rheumatism, the various forms of chronic arthritis, fibrositis and neuritis, neurasthenia, chronic nephritis, and for those requiring a dry, not relaxing, warm climate.

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Royal Society of Medicine—1, Wimpole Street, W., incorporated by Royal Charter, 1834 and Supplemental Charter, 1907, and embracing the following Sections :—Anæsthesical—Bathological and Climatological—Children's Diseases—Clinical—Dermatological—Electro-Therapeutical—Epidemiological and State Medicine—Historical—Laryngological—Medical—Neurological—Obstetrical and Gynæcological—Odontological—Ophthalmological—Otological—Pathological—Psychiatry—Surgical (with sub-sections of Orthopaedics and Proctology)—Therapeutical and Pharmacological.

Society for the Relief of Widows and Orphans of Medical Men—11, Chandos Street, W.

Society for the Study of Inebriety—Hon. Sec., 139, Harley Street, W.

Society of Medical Officers of Health—1, Upper Montague Street, W.C.

Society of Members of the Royal College of Surgeons of England—Sec., S. C. Lawrence, M.B., M.R.C.S., 22, Latymer Road, Lower Edmonton, N.

Society of Tropical Medicine and Hygiene—11, Chandos Street, W.

State Medical Service Association—Sec., 24, Wimpole Street, W.

Tuberculosis Society—Sec., 66, Upper Walthamstow Road, N.E.

United Services Medical Society—Royal Army Medical College, Grosvenor Road, S.W.

West London Medico-Chirurgical Society—West London Hospital, W.

MEDICAL AND SCIENTIFIC PERIODICALS, Etc.

Alchemical Society, Journal of the—Eight numbers yearly, 2/- net each—H. K. Lewis & Co. Lim., 136, Gower Street, W.C.

Analyst—Monthly 2/—Simpkin & Co., 2-8, Orange Street, Leicester Sq., W.C.

Anatomy and Physiology, Journal of—Quarterly 21/- per annum.—Chas. Griffin & Co., Lim., Exeter Street, W.C.

Annals of Surgery—Monthly 2/—Cassell & Co. Lim., Ludgate Hill, E.C.

Bacteriology, Protozoology and General Parasitology, Review of—Six times per annum for 10/6—36-38, Whitefriars Street, E.C. (*See Advertisement.*)

Birmingham Medical Review—Monthly 1/-; 10/- per annum—Percival Jones, Lim., 148-149, Great Charles Street, Birmingham. (*See Advertisement.*)

Brain—Quarterly 4/—Macmillan & Co. Lim., St. Martin's Street, W.C.

Bristol Medico-Chirurgical Journal—Quarterly 1/6—Arrowsmith, Bristol. (*See Advertisement.*)

British Medical Journal—Weekly 6d.—429, Strand, W.C.

Burdett's Hospitals and Charities—Yearly 10/6—28-29, Southampton Street, W.C.

- Caledonian Medical Journal—Quarterly 1/—70, Mitchell Street, Glasgow.
- Charing Cross Hospital Gazette—Quarterly 2/6 per annum—Charing Cross Hospital, Chandos Street, W.
- Child, The—Monthly 2/—Bale, 83-91, Great Titchfield Street, W.
- Children's Diseases, British Journal of—Monthly 2/—Adlard & Son and West Newman, Bartholomew Close, E.C.
- Clinical Journal—Weekly 3d.—23, Bartholomew Close, E.C.
- Dental Directory—Yearly 3/6—Bale, 83-91, Great Titchfield Street, W.
- Dental Journal, British—1st and 15th, 6d.—19, Hanover Square, W.
- Dental Record—Monthly, 7/6 per annum—17, Newman Street, W.
- Dental Science, British Journal of—Monthly 6d., 14/- per annum—Bale, 83-91, Great Titchfield Street, W.
- Dental Surgeon—Weekly 3d., 13/- per ann.—Baillière, 8, Henrietta St., W.C.
- Dental Surgeon's Daily Diary and Appointment Book—Yearly 5/-, or 6/6—Bale, 83-91, Great Titchfield Street, W.
- Dentists' Register—Yearly 3/4—Constable, 10, Orange Street, W.C.
- Dermatology, British Journal of—Monthly 2/- net; 21/- per annum—H. K. Lewis & Co. Lim., 136, Gower Street, W.C.
- Dublin Journal of Medical Science—20/- per annum—41, Grafton Street, Dublin.
- Edinburgh Medical Journal—Monthly 2/—W. Green & Son Lim., Edinburgh.
- Glasgow Medical Journal—Monthly 2/—A. Macdougall, Mitchell St., Glasgow.
- Guy's Hospital Gazette—Fortnightly 6d.; 7/6 per annum—Ash & Co. Lim., Henry Street, Bermondsey, S.E.
- Guy's Hospital Reports—Yearly 10/6—7, Great Marlborough Street, W.
- Heart: A Journal for the Study of the Circulation—Quarterly, 20/- per annum—Shaw & Sons, 7, Fetter Lane, E.C.
- Homœopathic Journal, British—Monthly 1/—Bale, 83-91, Great Titchfield Street, W.
- Homœopathic World—Monthly 6d.—12, Warwick Lane, E.C.
- Hospital—Weekly 1d.; 8/8 per annum—28, 29, Southampton Street, W.C. (See Advertisement.)
- Hygiene, Journal of—Occasionally, 7/- each—Fetter Lane, E.C.
- Indian Medical Gazette—Monthly 19/- per annum—Thacker & Co., 2, Creed Lane, E.C. (See Advertisement.)
- Inebriety, British Journal of—Quarterly 1/—Baillière, 8, Henrietta St., W.C.
- Jennerian (Supplement to the Medical Officer)—36-38, Whitefriars Street, E.C.
- Lancet—Weekly 6d.: 23/3 per annum—423, Strand, W.C. (See Advertisement.)
- Laryngology, Rhinology, and Otology, Journal of—Monthly 2/-; 20/- per annum—Adlard & Son and West Newman, Bartholomew Close, E.C. (See Advertisement.)
- Laryngoscope, The—Monthly 25/- per ann.—Baillière, 8, Henrietta St., W.C.
- Liverpool Medico-Chirurgical Journal—Half-yearly, 2/6 each—H. K. Lewis & Co. Lim., 136, Gower Street, W.C.
- London Hospital Gazette—6/- per annum—5, Rupert Street, E.
- Medical Annual—Yearly 10/- net—John Wright & Sons Lim., Bristol.
- Medical Chronicle—Monthly 1/6—33, Soho Square, W.
- Medical Directory—Yearly 15/- net—Churchill, 7, Great Marlborough St., W.
- Medical Magazine—Monthly 1/—44, Bedford Row, W.C.
- Medical Officer—Weekly 4d.; 15/- per annum—36-38, Whitefriars Street, E.C. (See Advertisement.)
- Medical Press and Circular—Weekly 5d.; 21/- per annum—Baillière, 8, Henrietta Street, W.C. (See Advertisement.)
- Medical Register—Yearly 10/6—Constable, 10, Orange Street, W.C.
- Medical Review—Monthly 1/6—70, Finsbury Pavement, E.C.
- Medical Temperance Review—Quarterly 6d.—Adlard & Son and West Newman, Bartholomew Close, E.C.
- Medical Times—Weekly 2d.—49 & 50, Watling Street, E.C.
- Medical Who's Who—Yearly 10/6 net—The Fulton-Manders Publishing Co., 75, Chancery Lane, W.C. (See Advertisement.)

- Medical World—Weekly 1d.—17, Fleet Street E.C. (*See Advertisement.*)
- Medical and Dental Students' Register—Yearly, 2/6—Constable, 10, Orange Street, W.C.
- Mental Science, Journal of—Quarterly 5/—7, Great Marlborough Street, W.
- Microscopical Science, Quarterly Journal of—10/—J. & A. Churchill, 7, Great Marlborough Street, W.
- Middlesex Hospital Journal—3/6 per annum—140, Wardour Street, W.
- Midland Medical Journal—Monthly 4d.—Greswolde House, Birmingham.
- Midwives' Roll—Yearly 10/6—Spottiswoode, 5, New Street Square, E.C.
- National Dental Hospital Gazette—Monthly from Oct. to March, 3/- per annum—Bale, 83-91, Great Titchfield Street, W.
- National Medical Journal—Monthly 3d.—364, Strand, W.C.
- Neurology and Psychiatry, Review of—25/- per annum—20, South Frederick Street, Edinburgh.
- New York Medical Journal—Weekly 6d.—66, West Broadway, New York.
- New York Medical Record—Weekly 6d.—Wm. Wood & Co., 51, Fifth Avenue, New York.
- Nurses' Own Magazine and Midwives' Record—Monthly, 2/- per annum—Baillière, 8, Henrietta Street, W.C.
- Nursing Mirror and Midwives' Journal—Weekly, 1d.—28, 29, Southampton Street, W.C.
- Nursing Notes and Midwives' Chronicle—Monthly 2d.—12, Buckingham Street, Strand, W.C.
- Nursing Times—Weekly 1d.—Macmillan & Co. Lim., St. Martin's St., W.C.
- Obstetrics and Gynaecology of the British Empire, Journal of—Monthly 2/6—Sherratt & Hughes, 33, Soho Square, W.
- Open-Air Schools and Children's Sanatoria, Year Book of—Yearly 7/6—Bale, 83-91, Great Titchfield Street, W.
- Ophthalmic Review—Monthly 1/-—33, Soho Square, W.
- Ophthalmological Society's Transactions—Yearly 12/6—J. & A. Churchill, 7, Great Marlborough Street, W.
- Ophthalmoscope—Monthly 2/-—Pulman & Sons Lim., 24, Thayer Street, W.
- Parasitology—Quarterly 30/- per annum—Cambridge University Press, Fetter Lane, E.C.
- Pathology and Bacteriology, Journal of—Quarterly 21/- per annum—Pathological Laboratory, Museums, Cambridge.
- Pharmaceutical Journal—Weekly 6d.—17, Bloomsbury Square, W.C.
- Pharmacology and Experimental Therapeutics, Journal of—six times per annum for 21/-—Cambridge University Press, Fetter Lane, E.C.
- Pharmacy, Year Book of—Yearly 10/-—7, Great Marlborough Street, W.
- Physiology (Experimental), Quarterly Journal of—25/- per annum—Chas. Griffin & Co. Lim., Exeter Street, W.C.
- Physiology, Journal of—Occasionally, 21/- per volume—Fetter Lane, E.C.
- Polyclinic—Monthly 6d.—Bale, 83-91, Great Titchfield Street, W.
- Practitioner—Monthly 2/6; 25/- per annum—2, Howard Street, Strand, W.C. (*See Advertisement.*)
- Prescriber—Monthly 1/-; 10/- per annum—6, South Charlotte Street, Edinburgh. (*See Advertisement.*)
- Psychology, British Journal of—Occasionally 15/-—Cambridge University Press, Fetter Lane, E.C.
- Psychology (Abnormal), Journal of—Bi-monthly 16/- per annum—Baillière, 8, Henrietta Street, W.C.
- Public Health—Monthly 1/8—1, Upper Montague Street, W.C.
- Public Health, Journal of the Royal Institute of—Monthly 2/-—37, Russell Square, W.C.
- Quarterly Journal of Medicine—Quarterly 8/6—Oxford University Press, Amen Corner, E.C.
- R.A.M.C., Journal of the—Monthly 2/-—Bale, 83-91, Great Titchfield St., W.
- Radiology and Electro-Therapy, Archives of—Monthly 2/-—20 and 21, Bedford Street, W.C.

- Röntgen Society, Journal of the—Quarterly 4/—Smith & Ebbs Lim., Northumberland Alley, Fenchurch Street, E.C.
- Royal Dental Hospital Reports—Quarterly, 5/- per annum—Bale, 83-91 Great Titchfield Street, W.
- Royal Naval Medical Service, Journal of the—Quarterly, 15/- per annum—83-91, Great Titchfield Street, W.
- Royal Sanitary Institute, Journal of the—Monthly 1/-—12, Long Acre, W.C.
- Royal Society of Medicine, Proceedings of the—Monthly, Nov. to July, 7/6 each part—Longmans, Green & Co., 39, Paternoster Row, E.C.
- Sanitary Record—Weekly 3d.; 14/- per ann.—55-56, Chancery Lane, W.C.
- School Hygiene—Quarterly, 4/6 per ann.—Adlard, Bartholomew Close, E.C.
- South African Medical Record—Fortnightly 1/-; 21/- per annum—Baillière, 8, Henrietta Street, W.C.
- St. Bartholomew's Hospital Journal—Monthly 6d.—Students' Union, St. Bartholomew's Hospital, E.C.
- St. George's Hospital Gazette—Monthly 6d.—83-91, Great Titchfield St., W.
- St. Mary's Hospital Gazette—Monthly 5/- per annum—187, Edgware Rd., W.
- St. Thomas's Hospital Reports—Yearly 8/6—7, Great Marlborough Street, W.
- State Medicine, Journal of—Monthly, 2/-—Bale, 83-91, Gt. Titchfield St., W.
- Surgery, British Journal of—Quarterly, 7/6 net; 25/- per annum—John Wright & Sons Lim., Bristol. (*See advertisement.*)
- Surgery, Gynaecology, and Obstetrics, and International Abstract of Surgery—Monthly, 5/-; 50/- per annum—Baillière, 8, Henrietta Street, W.C.
- Tropical Diseases Bulletin—Fortnightly 1/6—Baillière, 8, Henrietta Street, W.C.
- Tropical Life—Monthly 1/-—Bale, 83-91, Great Titchfield Street, W.
- Tropical Medicine and Hygiene, Journal of—Fortnightly 1/-; 18/- per annum—Bale, 83-91, Great Titchfield Street, W.
- Tropical Medicine and Hygiene, Transactions of the Society of—Eight numbers yearly, 3/6 net each—H. K. Lewis, 136, Gower Street, W.C.
- Tropical Medicine and Hygiene, Year Book of—Yearly 7/6—Bale, 83-91, Great Titchfield Street, W.
- Tropical Medicine and Parasitology, Annals of—Quarterly, 22/6 per annum—University Press, 57, Ashton Street, Liverpool.
- Tuberculosis, British Journal of—Quarterly 1/6—Baillière, 8, Henrietta Street, W.C. (*See advertisement.*)
- Tuberculosis Year Book and Sanatoria Annual—Yearly 7/6—Bale, 83-91, Great Titchfield Street, W.
- Universal Medical Record—Monthly, 25/- per annum—36-38, Whitefriars Street, E.C.
- University College Hospital Magazine—Six times during the year, 1/-—Bale, 83-91, Great Titchfield Street, W.
- West London Medical Journal—Quarterly 1/-—23, Bartholomew Close, E.C.

SELECTED MEDICAL TRADES DIRECTORY.

Ambulances.

- Austin Motor Co. (1914) Lim., Long-bridge Works, Northfield, Birmingham.
- Bridge, G. E. & Co. Lim., 128, Old Christchurch Road, Bournemouth.

Artificial Eyes.

- Grossmith, W. R., 110, Strand, W.C.
- Pache & Son, 75, Station Street, Birmingham

Artificial Limbs.

- Critchley, J. & Sons, 18, Great George Street, Liverpool
- Ferris, J. & E., 33, Museum Street, W.C.
- Braid, A. E. & Co. Lim., 30, Gower Place, Gower Street, W.C.
- Gray & Selby, Pelham Street, Nottingham.
- Grossmith, W. R., 110, Strand, W.C.
- Haywood, J. H. Lim., Castle Gate, Nottingham.

Bandage and Antiseptic Dressing Manufacturers.

- Braid, A. E. & Co. Lim., 30, Gower Place, Gower Street, W.C.
 King, A. Charles, 63, Ronalds Road, Highbury, N.
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Dietetic Articles (Manufacturers of).

- Allen & Hanburys Lim., Lombard Street, E.C.
 Brand & Co. Lim., Mayfair Works, Vauxhall, S.W.
 Brown, Gore & Co., Tower House, 40, Trinity Square, E.C. (Gautier Frères' Brandy)
 Burrow, W. & J., The Springs, Malvern (Waters)
 Cadbury Bros. Lim., Bournville, Birmingham
 Callard & Co., 74, Regent Street, W. (Diabetic Foods)
 Camwal Lim., 112, Pembroke Street, N. (Waters)
 Casein Lim., Culvert Works, Battersea, S.W.
 Fry, J. S. & Sons Lim., Bristol & London
 Liebig's Extract of Meat Co., Lim., Thames House, E.C.
 Maltine Manufacturing Co., Lim., 183, Acton Vale, W.
 Rattray, A. Dewar, 188, Dumbarton Road, Partick, Glasgow (Wines and Spirits)
 Valentine's Meat-Juice Co., Richmond, Virginia, U.S.A.
 Wander, A. Lim., 45, Cowercross Street, E.C.
 Watford Mfg. Co., Victoria Works, Watford.
 Wells, J. O., 1, Manor Road, Brockley, S.E. (Diabetic Gluten Breads)

Druggists (Principal Wholesale).

- Allen & Hanburys Lim., 37, Lombard Street, E.C.
 Alliance Drug & Chemical Co., 34, Leadenhall Street, E.C.
 Anglo-American Pharmaceutical Co. Lim., Croydon.
 Bishop, Alfred, Lim., 48, Spelman Street, N.E.
 Boots Pure Drug Co. Lim., Nottingham
 Bresillon, M. & Co., Gamage Buildings, Holborn, E.C.

- Bristol-Myers Co., 277-281, Greene Avenue, Brooklyn, New York
 British Organotherapy Co. Lim., Carlton House, Lower Regent Street, S.W.
 Burroughs Wellcome & Co., Snow Hill Buildings, E.C.
 Christy, Thos. & Co., 4, 10, & 12, Old Swan Lane, E.C.
 Denver Chemical Mfg. Co., 41, St. Ann's Road, Bow, London, E.
 Duncan, Flockhart & Co., 143, Farringdon Rd., E.C., & Edinburgh
 Evans Sons Lescher & Webb Lim., 60, Bartholomew Close, E.C., and 56, Hanover Street, Liverpool
 Fellows Company of New York, 26, Christopher Street, New York.
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 Fletcher, Fletcher & Co. Lim., Thane Road, Holloway, N.
 Gale & Co. Lim., 15, Bouverie St., E.C.
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 Guyot-Guenin & Son, 67, Southwark Bridge Road, S.E.
 Harris (Philip) & Co. Lim., Edmund Street, Birmingham
 Hewlett, C. J. & Son Lim., 35-42, Charlotte Street, E.C.
 Hoffmann-La Roche Chemical Works Lim., 7 and 8, Idol Lane, E.C.
 Hough, Hoscason & Co., Bridge St., Manchester
 Howards & Sons Lim., Ilford, N.E.
 Martindale, W., 10, New Cavendish Street, W.
 Matthews, Harold E. & Co., 30, The Mall, Clifton, Bristol
 Maw, S., Son & Sons, 7-12, Aldersgate Street, E.C.
 May, Roberts & Co. Lim., 7-11, Clerkenwell Road, E.C.
 Menley & James Lim., Menley House, Farringdon Road, E.C.
 Midgley, Chas., Lim., 4, Exchange Street, Manchester
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 Oppenheimer, Son & Co., Lim., 179, Queen Victoria Street, E.C.
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 Sumner, R. & Co. Lim., 40, Hanover Street, Liverpool
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 Woolley, Jas., Sons & Co. Lim., Victoria Bridge, Manchester
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 Zimmermann, Chas. & Co. (Chemicals), Lim., 9 & 10, St. Mary-at-Hill, E.C.

Electro-Medical, X-Ray, and Scientific Instrument Makers.

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 Bausch & Lomb Optical Co., 37 and 38, Hatton Garden, E.C.
 Cavendish Electrical Co. Ltd., 105-107, Great Portland Street, W.
 Cox, Harry W. & Co. Lim., 159-161, Great Portland Street, W.
 Dean, Alfred E., Leigh Place, Brooke Street, Holborn, W.C.
 Elliott & Sons Lim., Barnet, Herts. (X-Ray Plates).
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 Kodak Ltd. (Wratten Divis.), Kodak House, Kingsway, W.C. (X-Ray Plates)
 Medical Supply Association, 167-185, Gray's Inn Road, W.C.
 Mottershead & Co., 7, Exchange St., Manchester
 Newton & Wright Lim., 72, Wigmore Street, W.
 Schall & Son, 71 and 75, New Cavendish Street, W.
 Siemens Bros. & Co. Lim., Caxton House, Westminster, S.W.
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Opticians.

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 Bruce, Green & Co. Lim., 14-18, Bloomsbury Street, W.C.
 Davidson, F. & Co., 29, Great Portland Street, W.
 Newton & Wright Lim., 72, Wigmore Street, W.

Opticians (Dispensing).

Hamblin Lim., 5, Wigmore Street, and 50, New Cavendish Street, W.; 9, Peter Street, Manchester; 296, Glossop Road, and 38, Infirmary Road, Sheffield.

Printers (Medical).

Cassell & Co. Lim. Ludgate Hill, E.C.
 Wright, John & Sons Lim., Bristol

Publishers and Booksellers (Medical).

Adlard & Son and West Newman, Bartholomew Close, E.C.
 Appleton, D. & Co. 25 Bedford Street, Covent Garden, W.C.
 Arnold, Edward, 41 & 43, Maddox Street, W.
 Baillière, Tindall & Cox, 8, Henrietta Street, W.C.
 Bale, John Sons & Danielsson Lim., 83-91, Great Titchfield St., W.
 Black, A. & C., Lim., Soho Square, W.
 Butterworth & Co., Bell Yard, Temple Bar, W.C.
 Cambridge University Press (C. F. Clay), Fetter Lane, E. C.
 Cassell & Co. Lim., La Belle Sauvage, Ludgate Hill, E.C. (and Printers)
 Churchill, J. & A., 7, Great Marlborough Street, W.
 Constable & Co. Lim., 10, Orange Street, W.C.
 Cornish Bros. Lim., 39, New Street, Birmingham
 Fannin & Co. Lim., Grafton Street, Dublin
 Glaisher, Henry J., 55 and 57, Wigmore Street, W.
 Green, W. & Son Lim., St. Giles Street, Edinburgh
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 Heinemann, William (Successor to Rebman Lim.), 21, Bedford Street, W.C.
 Hilton & Co., 109, College Street, Calcutta, India
 Jack, T. C. & E. C., Causewayside, Edinburgh.

Kimpton, Henry (Hirschfeld Bros. Lim.), 263, High Holborn, W.C.
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 Macmillan & Co. Lim., St. Martin's Street, W.C.
 Medical Publishing Co. Lim., 23, Bartholomew Close, E.C.
 Methuen & Co. Lim., 36, Essex Street, W.C.
 Murray, John, Albemarle Street, W.
 Nisbet, Jas. & Co. Lim., 22, Berners Street, W.
 Oliver & Boyd, Tweeddale Court Edinburgh
 Oxford Medical Publications (Henry Frowde and Hodder & Stoughton), Falcon Square, E.C.
 Oxford University Press (Humphrey Milford), Amen Corner, E.C.
 Pulman, Geo. & Sons Lim., Thayer Street, W.
 Saunders, W. B. Co., 9, Henrietta Street, W.C.
 Scientific Press Lim., 28 and 29, Southampton Street, W.C.
 Sherratt & Hughes, University Press, 34, Cross Street, Manchester
 Simpkin, Marshall, Hamilton, Kent & Co. Lim., Stationers' Hall Court and Paternoster Row, E.C.
 Smith, Elder & Co., 15, Waterloo Place, S.W.
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 University of London Press Lim., Warwick Square, E.C.
 Wright, John & Sons Lim., Bristol (and Printers); London Depot, Stationers' Hall Court, E.C.

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Hobson, J. T. & Co., Bedford.

Surgical Instrument and Appliance Manufacturers.

Alexander & Fowler, 104 and 106, Pembroke Place, Liverpool
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Arnold & Sons, Giltspur Street, E.C.
 Bailey, W. H. & Son, 38, Oxford Street, W.
 Barth, Geo. & Co., 54, Poland Street, Oxford Street, W. (Inhalers).
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 Coles, William & Co., 5, Sackville St., Piccadilly, W. (Trusses)
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 Fannin & Co. Lim., Grafton Street, Dublin
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 Freeman, John, 6, St. Ann's Terrace, Circus Road, Regent's Park, N.W. (Orthopædic Boot and Shoe Maker)
 Gardner, J. & Son, 32, Forrest Road, Edinburgh
 Gray & Selby, Pelham Street, Nottingham.
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 Holborn Surgical Instrument Co. Lim., 26, Thavies Inn, E.C.
 Holden Bros., 3, Harewood Place, Oxford Street, W. (Footwear)
 Holland & Son, 46, South Audley Street, W. (Foot Supports)
 Hospitals & General Contracts Co. Lim., 25-35, Mortimer Street, W.
 Krohne & Sesemann, 37, Duke Street, W.
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 Maw, S., Son & Sons, 7 to 12, Aldersgate Street, E.C.
 Mayer & Meltzer, 71, Great Portland Street, W.
 Medical Supply Association, 167-185, Gray's Inn Road, W.C.
 Millikin & Lawley, 165, Strand, W.C.

Montague, J. H., 69, New Bond Street, W.
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Salmon Ody Lim., 7, New Oxford Street, W.C. (Trusses).
Salt & Son Lim., 7, Cherry Street, Birmingham
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Skeffington, A., 49, Ulundi Road, Blackheath, S.E. (Invalid Lifters)
Sumner, R. & Co. Lim., 40, Hanover Street, Liverpool
Surgical Manufacturing Co., 85, Mortimer Street, W.
Thackray, Chas. F., 66-70, Great George Street, Leeds

Weiss, John & Son Lim., 287, Oxford Street, W.
White & Wright, 93, Renshaw Street, Liverpool
Woolley, Jas. Sons & Co. Lim., Victoria Bridge, Manchester
Young (Archibald) & Son, 57-61, Forrest Road, Edinburgh

Thermometer Manufacturers.

Zeal, G. H., 82, Turnmill Street, E.C.

Typewriters.

The Hammond Typewriter Co. Lim., 75, Queen Victoria Street, E.C.

Vaccine Lymph.

Government Lymph Establishment, Colindale Avenue, The Hyde, N.W. Lymph is supplied, free of charge, to Public Vaccinators, on application to the Clerk

NOTE BOOK.

It is easier to make a note of a thing than to remember *where* the note was made. The following pages are indexed under their respective headings, and any note can be immediately found when required.

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W	* 5 12 19 26 *
Th	* 6 13 20 27 *
F	* 7 14 21 28 *
S	* 1 8 15 22 29 *

NOTES.

Copy here any formula or fact you wish to keep for reference.
(These pages are indexed under the word "Notes.")

1916

FEBRUARY.	
S	* 6 13 20 27
M	* 7 14 21 28
Tu	1 8 15 22 29
W	2 9 16 23 *
Th	3 10 17 24 *
F	4 11 18 25 *
S	5 12 19 26 *

IRISH LINEN MESH BANDAGES.

For Varicose Veins, Sprains, &c.

Hygienic, porous, absorbent, washable, durable. $2\frac{1}{2}$ in. 2/-; 3 in. 2/3; 5 in. 7/6. $3\frac{1}{2}$ yards long, taped or supplied any length.

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DONEGALL SQUARE, W., BELFAST.

1916

MARCH.	
S	* 51219 96
M	* 61320 97
Tu	* 71421 98
W	1 81522 99
Th	2 91623 80
F	3 101724 81
S	4 111825 *

NOTES.

1916

APRIL	
S	* 2 91623 80
M	* 3 101724 *
Tu	* 4 111825 *
W	* 5 121926 *
Th	* 6 132027 *
F	* 7 142128 *
S	1 81522 29 *

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ESTABLISHED

1755.

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(20 YEARS OLD.)

See Advertisement, page lxviii.

1916

MAY.	
S	* 71431 28
M	1 81522 20
Tu	2 91623 80
W	3101724 61
Th	4111825 *
F	5121926 *
S	6132027 *

NOTES.

1916

JUNE.	
S	* 4111825
M	* 5121926
Tu	* 6132027
W	* 7142128
Th	1 8152229
F	2 9162330
S	3101724 *

COLES' SPIRAL SPRING TRUSS.

INVENTORS AND MAKERS—

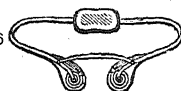
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Particulars by post.



1916

JULY.	
S	* 2 9 16 23 30
M	* 3 10 17 24 31
Tu	* 4 11 18 25 *
W	* 5 12 19 26 *
Th	* 6 13 20 27 *
F	* 7 14 21 28 *
S	1 8 15 22 29 *

NOTES.

1916

AUGUST.	
S	* 6 13 20 27
M	* 7 14 21 28
Tu	1 8 15 22 29
W	2 9 16 23 30
Th	3 10 17 24 31
F	4 11 18 25 *
S	5 12 19 26 *

COLES' SPIRAL SPRING TRUSS.

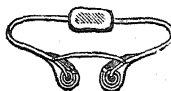
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Particulars by post.

1916

SEPTEMBER.	
S	* 8101734
M	* 4111825
Tu	* 5121936
W	* 6132027
Th	* 7142124
F	1 8152220
S	2 9162330

NOTES.

1916

OCTOBER.	
S	1 8152220
M	2 9162330
Tu	3 10172431
W	4 111825 *
Th	5 121926 *
F	6 132027 *
S	7 142128 *

COLES' SPIRAL SPRING TRUSS.

INVENTORS AND MAKERS—

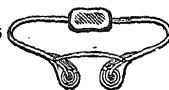
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LATE 225, PICCADILLY, W.)

Particulars by post.



1916

NOVEMBER.	
S	* 5121926
M	* 6132027
Tu	* 7142128
W	1 8152229
Th	2 9162330
F	3101794 *
S	4111825 *

NURSES.

Note whether Midwifery or Sick Nurses,
their terms and addresses.

1916

DECEMBER.	
S	* 310172431
M	* 4111825 *
Tu	* 5121926 *
W	* 6132027 *
Th	* 7142128 *
F	1 8152229 *
S	2 9162330 *

COLES' SPIRAL SPRING TRUSS.

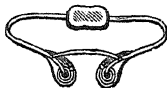
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TRUSS SPECIALISTS,

5, Sackville Street, Piccadilly, LONDON, W.

(LATE 225, PICCADILLY, W.)

Particulars by post.

1917

JANUARY.	
S	* 7142128
M	1 8152229
Tu	2 9162330
W	3 10172431
Th	4 111825 *
F	5 121926 *
S	6 132027 *

ADDRESSES (PRIVATE).

1917

FEBRUARY.	
S	* 4111825
M	* 5121926
Tu	* 6132027
W	* 7142128
Th	1 81522 *
F	2 91623 *
S	3 101724 *

BISEDIA

See full announcement on page lvi.

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THIRD PARTY. PLATE CLASS. LIVE STOCK, Etc.

INDEX TO LIFE ASSURANCE OFFICES.

A, when Established ; B, C, D, Annual Premiums to Insure £100 on death, with Profits, at the age of 30, 40, and 50 ; E, Assurance and Annuity Funds, exclusive of Paid-up Capital.
M, Mutual Offices ; P, Proprietary Offices.

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TITLE, ETC., OF OFFICE.	A	B	C	D	E
Abstainers and General Insurance Co., Ltd., Edmund St., Birmingham. <i>Act. & Sec.</i> R. A. Craig A.I.A. P	1883	40/11	55/10	82/3	£ 855,303
Alliance Assurance Co. Ltd., Bartholomew Lane, E.C. <i>Gen. Man.</i> , Robert Lewis P	1824	48/9	64/5	90/9	*7,343,477
Atlas Assurance Co. Ltd., 92, Cheapside, E.C. <i>Act.</i> , William Penman. <i>Gen. Man.</i> , Saml. J. Pipkin P	1808	49/3	63/7	88/8	2,279,946
Australian Mutual Provident Society, Life, Endowments and Annuities, 37, Threadneedle Street, E.C. <i>Res. Sec.</i> , A. C. Hollingworth. Further particulars see page 803 M	1849	48/2	64/5	89/10	34,000,000
Britannic Assurance Co. Ltd., Life, En- dowment Assurances, House Purchase, Broad Street Corner, Birmingham. <i>Chair-</i> <i>man</i> , F. T. Jefferson, J.P. <i>Secretary</i> , J. A. Jefferson, F.I.A. Further particulars see page 802 P	1866	48/6	65/2	94/-	3,800,000
British Equitable Assurance Co. Ltd., 1, 2, 3, Queen Street Place, E.C. <i>Manager</i> , Basil May, F.I.A. P	1854	48/8	64/11	91/9	1,650,062
Caledonian Insurance Co., 19, George Street, Edinburgh. <i>Gen. Man.</i> , Robert Chapman. London Offices, 82, King William Street, E.C., and 14, Waterloo Place, S.W. P	1805	48/9	64/6	88/6	3,462,827
Canada Life Assurance Co., 15, King Street, Cheapside, E.C. <i>Man.</i> , A. D. Cheyne P	1847	48/9	65/10	96/8	10,947,109
Century Insurance Co. Ltd., 18, Charlotte Sq., Edinburgh. <i>Gen. Man.</i> , Hy. Brown. <i>Sec.</i> , John R. Little. London Office, 27, Queen Victoria St., E.C. <i>Man.</i> , S. G. Pasfield	1885	50/-	65/4	91/-	1,209,020
City Life Assurance Co. Ltd., 6, Paul St., Finsbury, E.C. <i>Gen. Man.</i> , M. Gregory Further particulars see page 804 M	1897	44/1	60/11	89/7	457,743
Clergy Mutual Assurance Society, Life, 2 & 3, Sanctuary, Westminster. <i>Act. and</i> <i>Man.</i> , F. B. Wyatt. <i>Sec.</i> , F. T. M. Byers. Further particulars see page 801 M	1829	46/4	62/2	87/4	4,823,814
Clerical, Medical and General Life Assurance Society, 15, St. James's Square, S.W., and 1, King William Street, E.C. <i>Gen. Man. &</i> <i>Act.</i> , A. D. Besant P	1824	48/7	66/9	96/3	6,223,406
Colonial Mutual Life Assurance Society Ltd., 33, Poultry, E.C. <i>Man.</i> , Arthur E. Gibbs. <i>Assist. Man.</i> , E. A. Cawdon M	1873	47/4	63/2	89/9	3,925,000
Commercial Union Assurance Co. Ltd., 24, 25, and 26, Cornhill, E.C. <i>Act.</i> , A. G. Allen P	1861	47/10	65/2	92/4	6,052,377
Co-operative Insurance Society Ltd., 109, Corporation Street, Manchester. <i>Man.</i> , James Odgers. Further particulars see page 805 P	1867	47/4	63/1	90/1	550,000
Eagle Insurance Co., 79, Pall Mall, S.W. <i>Man.</i> <i>& Act.</i> , F. B. Galer, B.A., F.I.A. <i>Sec.</i> , J. F. E. Hall P	1807	48/7	64/5	89/10	*2,058,124
Edinburgh Life Assurance Co., 26, George Street, Edinburgh. <i>Man.</i> , T. M. Gardiner. <i>Sec. & Act.</i> , A. E. Sprague, D.Sc., F.F.A., F.I.A. London, 3, Birch Lane, E.C. <i>Sec.</i> , J. J. Bisgood P	1823	47/11	64/2	90/2	4,309,360
English and Scottish Law Life Assurance Association, 33, St. James's Square, S.W. <i>Gen. Man.</i> , Albert G. Scott. <i>Act. & Sec.</i> , John Spencer, F.I.A. P	1839	47/1	62/8	87/9	3,174,370

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Equitable Life Assurance Society, Mansion House Street, E.C. <i>Act. & Man.</i> , W. P. Elderton. M	1762	53/5	67/11	90/7	£ 5,233,777
Equity and Law Life Assurance Society, 18, Lincoln's Inn Fields, W.C. <i>Act. & Sec.</i> , W. P. Phelps, M.A., F.I.A. P	1844	48/10	64/6	90/9	4,987,117
Friends' Provident Institution, Bradford, Yorkshire. <i>Sec.</i> , William H. Gregory. <i>Act.</i> , Alfd. Moorhouse, F.I.A. M	1832	48/-	64/-	89/7	3,454,867
General Accident Fire and Life Assurance Corporation Ltd., Perth, Scotland. <i>Gen. Man.</i> , F. Norie-Miller, J.P. P	1885	49/2	64/11	91/3	168,788
General Life Assurance Co., 103, Cannon Street, E.C. <i>Man. & Sec.</i> , John Robert Freeman. Further particulars see page 802 P	1837	49/10	65/4	92/8	2,043,318
Gresham Life Assurance Society Ltd., St. Mildred's House, E.C. <i>Man. & Sec.</i> , Alexander Lawson. P	1848	47/6	62/10	88/6	10,309,966
Guardian Assurance Co. Ltd., 11, Lombard Street, and 21, Fleet St., E.C. <i>Man. & Sec.</i> , Geo. W. Reynolds. <i>Act.</i> , Ernest Woods P	1821	48/10	64/6	89/3	4,437,000
Law Union and Rock Insurance Co. Ltd., Old Serjeants Inn, Chancery Lane. <i>Gen. Man.</i> , R. Stirling. P	1806	48/4	64/-	89/10	8,187,871
Legal & General Life Assurance Society, 10, Fleet St., E.C. <i>Act. & Man.</i> , E. Colquhoun P	1836	50/9	65/11	90/9	9,210,702
Life Association of Scotland, 82, Princes St., Edinburgh. <i>Man.</i> , Gordon Douglas. <i>Sec.</i> , R. M. M. Roddick. London Office, 28, Bishopsgate, E.C. <i>Sec.</i> , J. C. Wardrop P	1838	48/11	64/10	91/1	6,039,861
Liverpool and London and Globe Insurance Co. Ltd., 1, Dale Street, Liverpool. <i>Gen. Man. & Sec.</i> , A. G. Dent. London Office, 1, Cornhill, E.C. P	1836	49/10	65/9	91/3	4,953,406
London and Lancashire Life and General Assurance Association Ltd., 66, 67, Cornhill, E.C. <i>Gen. Man.</i> , W. Aeneas Mackay. <i>Sec.</i> , Louis I. Jarvis. <i>Int. Ass. Secs.</i> , E. E. Dent and L. C. Kestin. <i>Act.</i> , Harold Dougharty P	1862	48/9	64/9	91/2	3,903,688
London Assurance Corporation, 7, Royal Exchange, E.C. <i>Man. of Life Dept.</i> , James Clunes. <i>Act.</i> , A. G. Hemming P	1720	49/-	64/8	90/2	2,640,187
London Life Association, Ltd., 81, King William Street, E.C. <i>Act. & Man.</i> , H. M. Trouncer, M.A., F.I.A. M	1806	47/-	61/8	85/4	5,437,826
Marine and General Mutual Life Assurance Society, 14, Leadenhall Street, E.C. <i>Act. & Sec.</i> , S. Day, F.I.A. M	1852	48/10	65/-	91/6	2,080,457
Metropolitan Life Assurance Society, 13, Moor-gate Street, E.C. <i>Sec.</i> , Bernard Woods. <i>Act.</i> , H. J. Baker, F.I.A. M	1835	49/9	66/4	92/-	2,128,580
Mutual Life and Citizens' Assurance Co. Ltd. (of Australia), Effingham Ho., 1, Arundel St. W.C. <i>Sec.</i> , Alex. S. Sellar, M.A., F.F.A. P	1886	48/9	65/3	89/9	9,156,861
Mutual Life Insurance Co. of New York, 7 & 8, Norfolk Street, Strand, W.C. <i>Gen. Man.</i> , J. H. Harrison Hogge. <i>Sec.</i> , T. Crawford M	1843	48/9	66/-	97/-	122,987,366
National Benefit Life and Property Assurance Co. Ltd., National House, Newgate Street, E.C. <i>Man.</i> , J. Francis, J.P., F.S.S. <i>Sec.</i> , S. F. Gaudell P	1890	48/1	64/8	91/4	3,265
National Mutual Life Assurance Society, 39, King Street, Cheapside, E.C. <i>Act. & Man.</i> , Geoffrey Marks, F.I.A. <i>Sec.</i> , H. J. Lockwood. <i>Asst. Act.</i> , E. W. Townley, F.I.A. M	1830	48/4	63/7	89/6	3,139,517
National Mutual Life Association of Australasia, Ltd., 5, Cheapside, E.C. <i>Man.</i> , H. W. Meyers. Further particulars see page 804 M	1869	46/8	61/6	87/2	9,000,000

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National Provident Institution, 48, Gracechurch Street, E.C. Act. & Sec., I. F. Hovill .. M	1835	50/2	66/3	91/1	£ 7,390,677
New York Life Insurance Co., Trafalgar Buildings, Trafalgar Square, London, W.C. Gen. Man., E. H. Krause. Sec., Wm. R. Collinson, F.C.I.S. .. M	1845	48/9	66/-	96/11	162,526,537
North British and Mercantile Insurance Co., 61, Threadneedle St., E.C., and 64, Princes St., Edinburgh. Home Fire & Ft. Life Man., D. C. Haldeman. Act., London, H. Lugton. Sec., R. Carmichael .. P	1809	49/10	66/1	91/11	16,689,490
Northern Assurance Co. Ltd., 1, Moorgate Street, E.C. Gen. Man., H. E. Wilson .. P	1836	40/-	64/8	90/10	5,384,003
Norwich Union Life Insurance Society, Norwich. Gen. Man. & Act., Davidson Walker. London Office, 49, Fleet Street, E.C. ..	1808	45/8	59/6	85/3	13,556,659
Pearl Assurance Co. Ltd., High Holborn, W.C. Int. Man'g Directors, F. D. Bowles, J. P., C.C., and G. Shrubbsall, J. P. .. P	1864	49/-	65/-	92/-	9,093,323
Phoenix Assurance Co. Ltd., Phoenix House, King William St., E.C., Trafalgar House, Waterloo Place, S.W., and 187, Fleet Street, E.C. Gen. Man., Sir Gerald H. Ryan, F.I.A. .. P	1752	48/11	64/7	90/8	11,654,278
Provident Clerks & General Mutual Life Assurance Association, 27 & 29, Moorgate Street, E.C. Act. & Sec., C. R. V. Coutts .. M	1840	46/4	62/8	92/2	2,943,963
Prudential Assurance Co. Ltd., Holborn Bars. Sec., G. E. May. Further particulars see page 803 .. P	1848	49/6	65/11	91/11	47,024,190
Refuge Assurance Co. Ltd., Oxford Street, Manchester. Gen. Mans., J. Proctor Green and W. H. Aldcroft. London Office, 133, Strand, W.C. .. P	1864	49/3	65/9	91/9	10,782,956
Royal Exchange Assurance Corporation, Royal Exchange, E.C., and 44, Pall Mall, S.W. Act., H. E. Nightingale, F.I.A. .. P	1720	49/-	64/9	90/2	4,627,427
Royal Insurance Co. Ltd., 1, North John St., Liverpool. Man., G. Chappell. London Offices, 24-28, Lombard Street. Sec., R. M'Connell .. P	1845	48/8	64/4	90/4	11,445,792
Sceptre Life Association Ltd., 40, Finsbury Pavement, E.C. Sec., W. E. Wright .. P	1864	48/8	64/8	90/6	1,219,174
Scottish Amicable Life Assurance Society, St. Vincent Place, Glasgow. Man., W. Hutton. Sec., C. Guthrie .. M	1826	51/9	66/3	90/1	6,492,286
Scottish Equitable Life Assurance Society, 28, St. Andrew Square, Edinburgh. Man. & Act., G. M. Low. Sec., J. J. McLauchlan. London Office, 13, Cornhill, E.C. Sec., P. W. Purves. .. M	1831	50/-	65/5	90/6	6,283,115
Scottish Life Assurance Co. Ltd., 19, St. Andrew Square, Edinburgh. Man., Sir David Paulin, F.R.S.E. London Office, 9 & 10, King St., E.C. Sec., J. Campbell .. P	1881	49/5	64/6	90/5	2,172,973
Scottish Provident Institution, 6, St. Andrew Square, Edinburgh. Man., J. G. Watson. Sec., R. T. Boothby. Joint Asst. Secs., C. W. Thomson & Jas. C. Lindsay. Act., W. G. Walton. London Offices, 3, Lombard St. E.C., and 17, Pall Mall, S.W. .. M	1837	42/4	56/6	83/2	15,963,692
Scottish Temperance Life & Accident Insurance Co., Ltd., 109, St. Vincent Street, Glasgow. Manager, Adam K. Rodger. London, 2, 3 & 4, Cheapside. Man., W. A. Bowie. Less 10 per cent to Whole Life Abstainers .. P	1883	48/6	63/9	89/10	2,284,074

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Scottish Union & National Insurance Co., 35, St. Andrew Square, Edinburgh. <i>Gen. Man.</i> , J. A. Cook. London Office, 5, Walbrook, E.C. <i>Sec.</i> , James G. Nicoll .. P	1824	48/9	64/6	89/6	£ 8,335,443
Scottish Widows' Fund Life Assurance Society, 9, St. Andrew Square, Edinburgh. <i>Man. & Act.</i> , G. J. Lidstone. <i>Sec.</i> , Geo. C. Stenhouse. London Offices, 28, Cornhill, E.C., and 17, Waterloo Place, S.W. M	1815	51/9	66/3	90/7	22,002,250
Standard Life Assurance Co., 3, George Street, Edinburgh. <i>Man.</i> , Leonard W. Dickson. London Offices, 83, King William St., <i>Sec.</i> , C. F. Fox, and 3, Pall Mall East, <i>Sec.</i> , F. M. Willats .. P	1825	48/11	64/5	89/-	13,600,000
Star Assurance Society, 32, Moorgate Street, E.C. <i>Gen. Man.</i> , J. Douglas Watson. P	1843	49/9	66/3	93/8	7,024,037
Sun Life Assurance Society, 63, Threadneedle Street, E.C. <i>Act.</i> , R. G. Salmon, F.I.A. <i>Sec. & Gen. Man.</i> , E. Linnell P	1810	49/2	66/6	94/2	10,912,182
Sun Life Assurance Co. of Canada, Canada House, 4 & 5, Norfolk Street, W.C. <i>Man.</i> , J. F. Junkin .. P	1865	48/6	65/4	94/1	11,211,938
United Kingdom Provident Institution, 196, Strand, W.C. <i>Sec.</i> , H. W. Ha-ser M	1840	49/6	65/-	91/10	10,337,121
University Life Assurance Society, 25, Pall Mall, S.W. <i>Act. & Sec.</i> , R. Todhunter, M.A. .. P	1825	49/11	65/4	91/5	952,120
Wesleyan & General Assurance Society, Life, Annuities, Sickness, Assurance Buildings, Steelhouse Lane, Birmingham. <i>Gen. Man.</i> , A. L. Hunt. London Office, Halton House, 20-23, Holborn, E.C. Further particulars see page 802 .. M	1841	48/1	65/8	93/10	2,393,815
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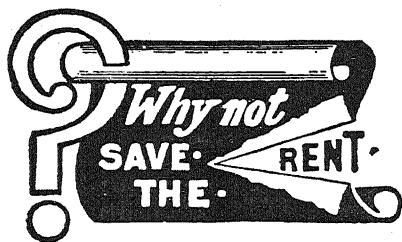
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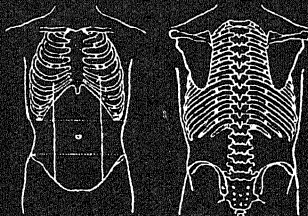
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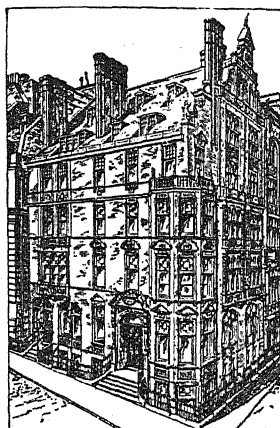
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All information, together with Examination Papers, etc., is given in the Calendar of the University of Durham College of Medicine, Newcastle-on-Tyne, which may be obtained gratis from the Secretary at the College.

Scholarships, &c.—University of Durham Scholarship, value £100 for proficiency in Arts, awarded annually to full students in their first year only. The Pears Scholarship value £150—for proficiency in Arts. Dickinson Scholarship—value the interest of £400, and a Gold Medal—for Medicine, Surgery, Midwifery, and Pathology. Tulloch Scholarship—value the interest of £400—for Anatomy, Biology, Chemistry, and Physics. Charlton Scholarship—value the interest of £700—for Medicine. Gibb Scholarship—value the interest of £300—for Pathology. Luke Armstrong Scholarship—interest on £680—for comparative Pathology. Stephen Scott Scholarship—interest on £1000—for promoting the study of Surgery and allied subjects. Heath Scholarship—the late George Yeoman Heath, M.D., M.B., D.C.L., F.R.C.S., President of the University of Durham College of Medicine, bequeathed the sum of £4000 to found a Scholarship in Surgery, the interest to be awarded every second year. Gibson Prize—value the interest of £225—for Midwifery and Diseases of Women and Children. The Turnbull Prize and Medal—for Surface Anatomy. The Outerson Wood Prize—value the interest of £250—for Psychological Medicine. The Goyder Memorial Scholarship (at the Infirmary)—value the interest of £325—for Clinical Medicine and Clinical Surgery. At the end of each Session, a Prize of Books is awarded in each of the regular Classes. Assistant Demonstrators of Anatomy, Prosecutors, and Assistant Physiologists are elected yearly. Pathological Assistants, Assistants to the Dental Surgeon, Assistants in the Eye Department, Clinical Clerks and Dressers are appointed every three months.

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 - III.—By three annual instalments of 40, 33, and 22 guineas respectively, at the commencement of the Sessional year.
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Further particulars may be obtained from the Sec., PROF. HOWDEN, at the College.

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Clinical Pathologist—DR. W. R. LOGAN.

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 2. Non-Resident House Physicians and Surgeons and Clinical Assistants, who must also be registered as legally qualified Practitioners, are appointed by the Managers on the recommendation of the Physicians and Surgeons. The appointment is on the same terms as that of the Resident Physicians and Surgeons.
 3. Clerks and Dressers are appointed by the Physicians and Surgeons. These appointments are open to all Students and Junior Practitioners holding Hospital Tickets.
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Pathology, Practical—Vacant.
Physics—C. G. Knott, M.A., D.Sc.
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Tropical Diseases—D. G. Marshall, Major I.M.S.
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Tropical Hygiene—J. B. Young, M.B., D.Sc. (conjointly with Professor).
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Opportunities for Hospital Practice are afforded at the Royal Infirmary, the Hospital for Sick Children, Maternity Hospital, the City Fever Hospital, and Asylum for the Insane. Upwards of 2,160 beds are available for the Clinical Instruction of Students of the University.

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The minimum Class Fees for M.B. and Ch.B., including Hospital Fee (£12), amount to about £130, and the Matriculation and Examination Fees to £28 7s. An additional Fee of £15 15s. is payable by those who proceed to M.D., and £15 15s. by those who proceed to Ch.M.

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A Syllabus and further information as to Matriculation, the Curricula of Study for Degrees, etc., may be obtained from the Dean of the Faculty of Medicine, and for Degrees in the Faculties of Arts, Science, Divinity, Law and Music, from the Deans of these Faculties; or from the Clerk of Senatus; and full details are given in the University Calendar, published by James Thin, 55, South Bridge, Edinburgh. Price by post, 3s. 6d.

By Authority of the Senatus,

L. J. GRANT, Secretary of Senatus.

July, 1915.

The Hospital for Sick Children

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Clinical Clerkships in the Wards and Clinical Assistantships in the Out-patient Department are also available for Students and Post-Graduates.

During each Session, Classes are held on Special Subjects, by Members of the Staff, Fee for a course of Six Meetings, £1 1s.

Fees for Hospital Attendances:—One Month's Ticket, £2 2s. Three Months' Ticket, £5 5s. Perpetual Ticket, £10 10s.

Special Reduced fee for Clinical Clerks for 3 months, £1 1s.

On Tuesdays and Fridays, from 5.15 to 6.15, a special Course of Instruction in the Surgical Diseases of Children is given throughout the year. Fee for 8 attendances, £1 1s.

Pathological Clerkships.—Facilities are afforded for obtaining Theoretical and Practical Instruction in Clinical Pathology and Bacteriology in the Pathological Laboratories. Clerks attend for about four hours daily. Fees:—For 1 month, £3 3s. For 2 months, £5 5s. For 3 months, £6 6s.

A reduction is made in the case of those already holding tickets for general attendance at the Hospital.

From time to time, during each term, special courses of instruction in the Medical and Surgical Diseases of Children are given, extending over a period of three weeks. During the Autumn Session a special course of Post-Graduate instruction is held for a period of a fortnight. Details are published in the medical journals during the month of September. Further particulars may be obtained from the Secretary or the Dean.

Signed, **GEORGE E. WAUGH, F.R.C.S.,** *Dean to the Medical School.*

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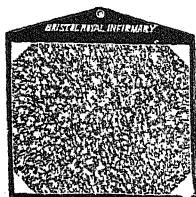
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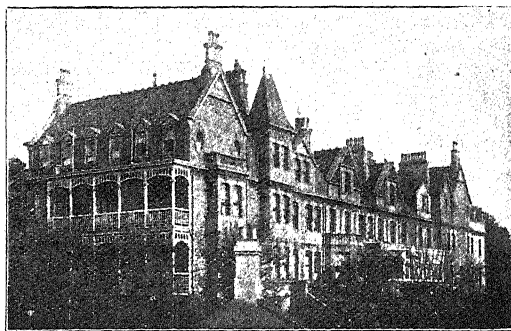
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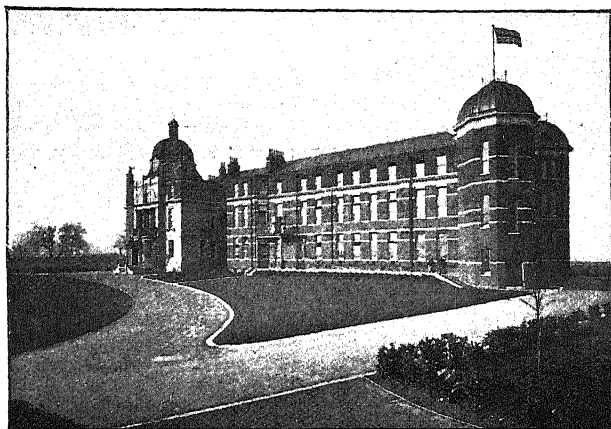
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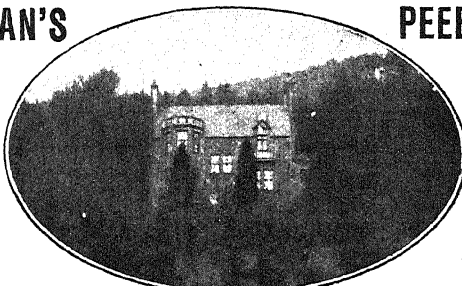
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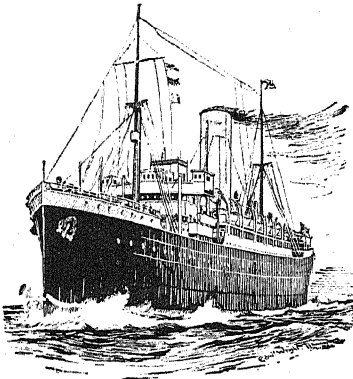
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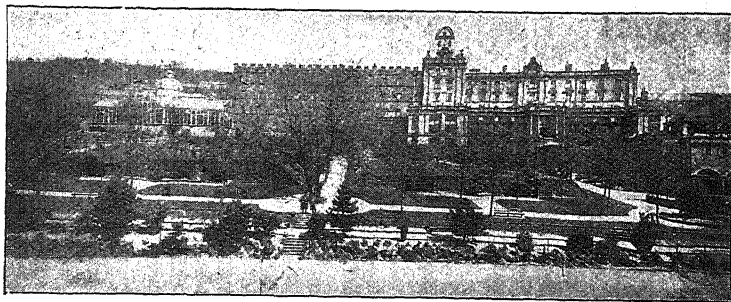
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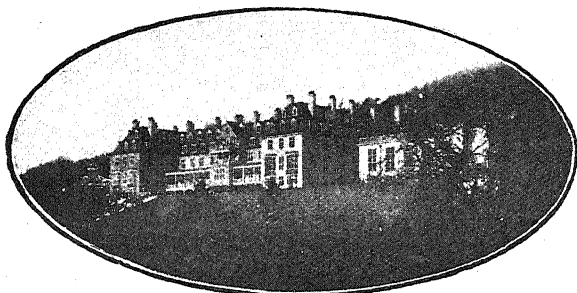
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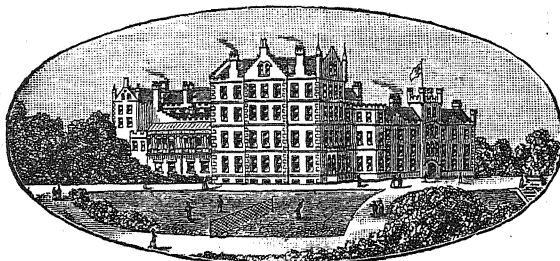
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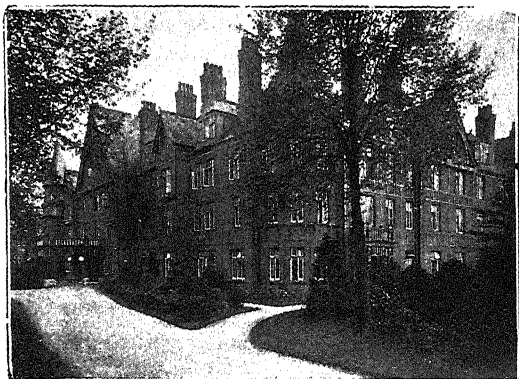


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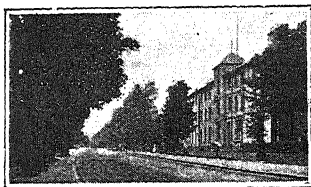
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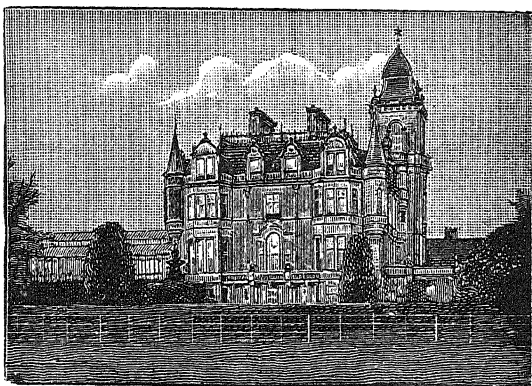
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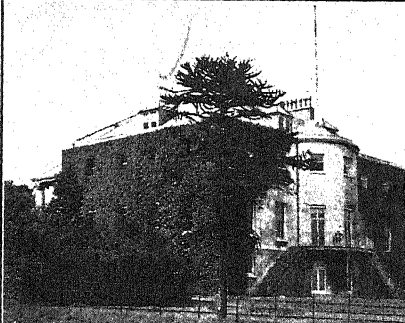
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HAYDOCK LODGE is a large Country Mansion especially adapted for the **Care and Treatment of Persons of Unsound Mind**, having been enlarged and rebuilt on plans sanctioned and approved by the Commissioners in Lunacy. It is charmingly situated in a healthy and retired neighbourhood, standing in its own well-timbered park of nearly 100 acres, with attached Farm, Gardens, extensive Vineyards, Conservatories, Lawn for Tennis, Cricket, Football, Bowls, Croquet and Golf. **NEWTON-LE-WILLOWS** (a first-class station on the L. & N.W. Ry., midway between Liverpool and Manchester), is two miles distant, where conveyances are always to be had.

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Haydock Lodge has also associated with it Establishments at **GRETA BANK** (for Ladies only), in the Craven district of YORKSHIRE, near Ingleton; and **OVERDALE**, near MANCHESTER, under the management of P. G. MOULD, L.R.C.P., M.R.C.S., late A.M.O. at Cheadle Royal Asylum.

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For MENTAL DISEASES, NORTHAMPTON.

FOR THE UPPER and MIDDLE CLASSES ONLY.

President—THE RIGHT HON. THE EARL SPENCER, K.G.



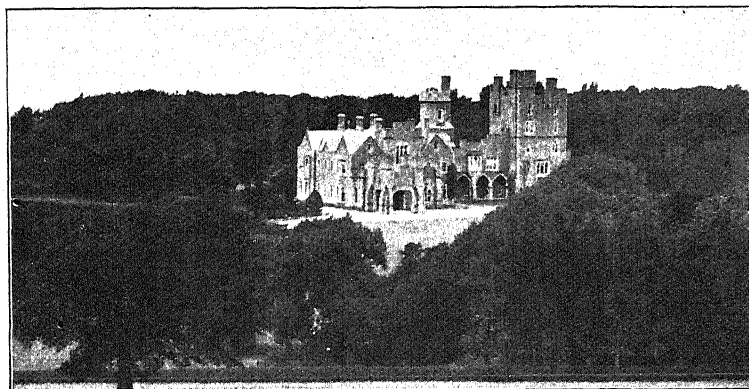
THIS Registered Hospital is pleasantly situated in 118 acres of park and pleasure grounds. Every facility is provided for cricket, football, hockey, croquet, lawn-tennis, bowls, golf, motoring, boating, and gardening. TERMS: from 31s. 6d. a week. Voluntary Boarders not under Certificates are received.

PATIENTS PAYING HIGHER RATES can have Special Attendants, Horses and Carriages, and Private Rooms in Villas in the Hospital Grounds, or at

MOULTON PARK,

a Branch Establishment, two miles from the Hospital, where there is a farm of 473 acres, which supplies the Hospital with meat, milk, and other farm produce.

BRYN-Y-NEUADD HALL, Llanfairfechan, N. Wales,



THE SEASIDE HOUSE OF ST. ANDREW'S HOSPITAL, is beautifully situated in a Park of 331 acres, close to the Sea, and in the midst of the finest scenery in North Wales. Patients can enjoy good cricket, lawn-tennis, croquet, golf, trout-fishing, and bathing. Patients or Boarders may visit this Branch for long or short periods, and can have Private Rooms in Villas in the Park.

FOR PARTICULARS APPLY TO THE MEDICAL SUPERINTENDENT,
ST. ANDREW'S HOSPITAL, NORTHAMPTON. Telephone No. 56.

Hendon Grove, Hendon, N.W.

A private Home, licensed by the Board of Control for the reception of 14 ladies suffering from mental and nervous affections. The Home (which stands in its own grounds of 15 acres, 300 ft. above sea level) is easily accessible either by tube to Golder's Green, or by motor-bus from all parts of London, while it is within 5 minutes' walk from Hendon Station on the Midland Railway. Established over 100 years, the



Home has been completely modernised, and all the equipment is up-to-date. The house is furnished as a private residence, and the whole surroundings are made as home-like as possible. It is provided with its own dairy and poultry farm, so that

all cream, milk, butter, eggs, poultry, vegetables, and fruit are of home produce. Tennis, croquet, motoring, carriage drives, and varied in- and out-door amusements. The fees vary from £5 5s. 0d. per week inclusive. A fully illustrated brochure can be obtained on application to the Resident Medical Officer. 'Phone 764 Finchley.

For the Treatment of Mental Diseases.

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Dr. STANLEY GILL and Dr. HAYES GILL may be consulted by appointment at 31, RODNEY STREET, LIVERPOOL, from 2 till 4.0 p.m. every Monday and Thursday.

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AN Institution licensed for the CARE and TREATMENT of the MENTALLY AFFLICTED of both Sexes. Conveniently situated. Electric trams and omnibuses from the Bridges and West-End pass the House. Private houses with electric light for suitable cases adjoining the Institution. Holiday parties sent to the Seaside branch at Worthing during Summer months.

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Telephone: Lavington 11.

Telegrams: "Benson, Market Lavington."

THIS Old-established Home for the Care and Treatment of LADIES and GENTLEMEN MENTALLY AFFLICTED is pleasantly and healthily situated, and stands in over 15 acres of Pleasure Grounds, Gardens, &c. Every indoor and outdoor amusement provided for the Patients, including Billiards, Cycling, and Carriage and Motor Exercise. Voluntary Boarders received without Certificates. *Railway Stations*—Lavington, G.W.R., 1½ miles; Devizes, G.W.R., 6 miles. 1½ hours from London.

For Terms, etc., apply to J. R. BENSON, F.R.C.S. Eng., Proprietor.

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Lambeth Road, LONDON, S.E.

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PATIENTS of the Educated Classes, in a presumably Curable condition, are alone eligible for Admission, and may be received either Free, or on payment of a fixed inclusive rate of 2 guineas per week. With a view to the early treatment of Eligible cases Voluntary or Uncertified Patients are admitted.

The following are NOT eligible :

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2. Those who are in a state of Idiocy, or subject to Epileptic Fits.
3. Those whose condition either threatens speedy dissolution of life or requires the permanent and exclusive attention of a nurse.

In connection with this Hospital, there is a **CONVALESCENT HOME** on the Surrey Hills at **WITLEY**.

For Forms or further particulars, apply to the Physician Superintendent,
J. G. PORTER PHILLIPS, M.D., M.R.C.P.

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President—The Right Hon. EARL MANVERS.

This Institution for the reception of **Private Patients** of both sexes of the **Upper and Middle Classes** only, at moderate rates of payment, is beautifully situated in its own grounds about two miles from Nottingham, and from its singularly healthy and pleasant position, and the comfort of its internal arrangements, affords every facility for the relief and cure of those mentally afflicted. Divine Service is held in the Institution every Sunday by the Chaplain, who also visits the Patients. Carriage and motor exercise is provided.

FOR TERMS, ETC., APPLY TO

DR. HUNTER, Physician-Superintendent.

COTON HILL MENTAL HOSPITAL.

NEAR STAFFORD.

Chairman of the Committee of Management—

THE RIGHT HONOURABLE THE EARL OF DARTMOUTH.

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PRIVATE ROOMS with Special Attendants in the Hospital, or semi-detached Villas in the grounds can be arranged. Terms on application.

For further particulars apply to **R. W. HEWSON, L.R.C.P. & S. Ed. (Ed. Univ.), Med. Supt.**

STRETTON HOUSE,

CHURCH STRETTON, SHROPSHIRE.

A Private Licensed House for the treatment of Gentlemen suffering from Nervous or Mental Diseases.

ESTABLISHED 1853.

SITUATED amongst charming scenery, more than 600 feet above the sea, large grounds, pure water, perfect sanitation, and enjoying the bracing air of the "English Highlands."

Easily accessible from all parts. Good train services on G.W. and L. & N.W. Railways.

Congenial occupation and recreation are specially attended to, and all sorts of indoor and outdoor amusements are provided.

Patients have carriage exercise and daily walks amongst the beautiful mountain scenery.

For Terms and further information, apply to—

THE MEDICAL SUPERINTENDENT.

Telegrams :
"Stretton House, Church Stretton."



Telephone :
10, Church Stretton.

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BOX (Near BATH).

Telephone: No. 2 Box.

LICENSED FOR THE TREATMENT OF DISEASES
OF THE BRAIN AND NERVOUS SYSTEM.

THIS House is situate 450 feet above sea level, and commands extensive views of the surrounding country.

Access—Box Station (G.W.R.); Bath Stations (Midland and G.W.R.) twenty minutes from the house.

For terms apply to—

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at the above,

Or at 17, BELMONT, BATH.

Telephone: No. 636, BATH.

BOREATTON PARK

THIS PRIVATE ASYLUM, which was founded by the late W. H. O. SANKEY, M.D., F.R.C.P., for the reception of a limited number of

LADIES & GENTLEMEN MENTALLY AFFLICTED,

— is now conducted by his son, —
E. H. O. SANKEY, M.A., M.B., B.C. Cantab.

The Ladies' Division is directly supervised by Mrs. SANKEY.

The Mansion stands high, among handsomely laid out gardens in the midst of a picturesque deer park (about 40 head of deer are kept), and commands a magnificent view of Welsh mountain scenery.

Carriages, horses, motor, lawn-tennis, golf, trout and other fishing are provided.

Arrangements can be made to enable friends of patients to reside in the House as Boarders if so desired.

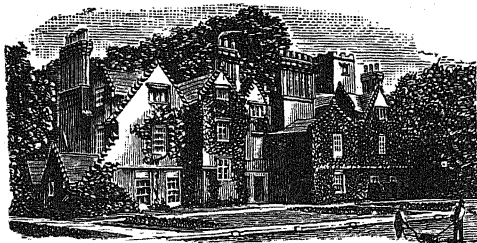
The Asylum is situate about ten miles from Shrewsbury, within easy distance of Baschurch Station, G.W.R., whither carriages can be sent at any time for visitors.

Letters and Telegrams should be addressed to—

Dr. SANKEY, Boreatton Park, Baschurch, SALOP.

THE MOAT HOUSE, TAMWORTH, STAFFS.

STATIONS: L. & N. WEST. & MIDLAND RAILWAYS.



A HOME for NERVOUS and MENTAL CASES.

The House stands in grounds of ten acres (within 5 minutes' drive of either Station), and is devoted to the Care and Treatment of a few Ladies suffering from Nervous and Mental Affections, who enjoy the comfort, privacy, and occupations of home life. Voluntary Patients are received without certificates.

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Resident Licensees:

EDWD. HOLLINS, M.A. Cantab.,
or (Mrs.) S. A. MICHAUX.

The RETREAT, LANCASTER.

A HOME FOR PRIVATE PATIENTS in a detached Villa, in connection with the County Asylum at Lancaster, but apart from the pauper department.

Terms from 21/- per week, without extras.

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NEW SAUGHTON HALL, which takes the place of Saughton Hall, established in 1798, is situated seven miles south of Edinburgh, in the beautiful neighbourhood of Hawthornden, and Rosslyn, and is surrounded by picturesque and well-timbered pleasure grounds extending to 125 acres. There is also a **SEASIDE HOUSE** at **GULLANE, EAST LOTHIAN**.

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Forms of Admission for Voluntary or Certified Cases, full instructions, etc., can be obtained on application to the Resident Medical Superintendent, **J. BATTY TUKE, M.D. F.R.C.P. Ed.**

Inclusive Terms from £84 to £400 per annum, according to requirements.

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ESTABLISHED A.D. 1713.

THIS Institution is an endowed Hospital, registered under the Lunacy Acts, and managed by a Board of Governors who have no pecuniary interest in its success, but whose sole object is to promote the comfort and well-being of the Patients. The Hospital is arranged for both sexes.

The terms for admission are Thirty-five shillings per week, or more, according to Patients' condition and circumstances, which includes everything, except clothing, carriage exercise, or any expenses incurred for amusement beyond the Hospital grounds.

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SAMUEL J. BARTON, M.D.

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RESIDENT MEDICAL SUPERINTENDENT:

SAVILLE J. FIELDING, M.B.

CLERK TO THE GOVERNORS:

FRANCIS HORNOR, QUEEN STREET, NORWICH.

MATRON:

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APPLICATION FOR ADMISSION TO BE MADE TO THE

Resident Medical Superintendent, BETHEL HOSPITAL, NORWICH.

SPRINGFIELD HOUSE

NEAR BEDFORD.

(TELEPHONE No. 17. Within an hour of London by Midland.)

AN INSTITUTION FOR THE

CARE AND CURE OF THE INSANE.

Under the Personal Direction of the Licensees:

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(Late Resident Medical Superintendent of Saughton Hall Asylum, Edinburgh.)

MR. W. S. BOWER AND MISS BELLARS.

(ASSISTED BY LADIES' AND GENTLEMEN'S COMPANIONS.)

Ordinary Terms :
THREE GUINEAS per Week.

Including separate Bedrooms for
all suitable cases.

The PLEASAUNCE, YORK.

Telephone : 184 York. Old Established MENTAL HOME for LADIES.



Licensed for 22 Ladies of the Upper & Middle Classes. The House stands in extensive well-wooded Grounds within the boundary of the city.

A special feature is made of the Treatment of Incipient Mental Cases, Certified or Voluntary.

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Telegrams : "PSYCHOLIA, LONDON."

Telephone : New Cross 1057.

For the Treatment of MENTAL DISORDERS.

Completely detached Villas for Mild Cases. Voluntary Boarders received. 20 acres of grounds. Cricket, tennis, croquet, squash racquets, bowls, and all indoor amusements. Daily Services in Chapel. Rev. Philip S. O'Brien, D.D., Chaplain. Ordinary Terms, 2 guineas a week.

Full Particulars from the SECRETARY.

Senior Physician : FRANCIS H. EDWARDS, M.D., M.R.C.P.

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Telegrams: "DICKSON, BUXTON."

National Telephone: 130, BUXTON.

WYE HOUSE ASYLUM, BUXTON, DERBYSHIRE.

ESTABLISHED IN 1858, FOR THE

*** CARE and TREATMENT OF THE INSANE of the Higher and Middle Classes.**

THE NEW INSTITUTION COMPLETED 1901.

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Physicians: **and ASSISTANT MEDICAL OFFICERS at Buxton and in N. Wales.**

Chaplain: Rev. Canon SCOTT-MONCRIEFF, M.A., D.D. (Vicar of Buxton and Rural Dean).

THIS Institution has been established for the Reception of Patients of Both Sexes of the Higher and Middle Classes, for whom it is admirably adapted by its position and appointments. It is erected on an eminence surrounded with scenery of the most varied character, and the views from the House and Terraces extend over many miles of picturesque country. There is also in connection a Summer Residence on the coast of North Wales. The House is furnished throughout on the most liberal scale, and fitted up and arranged as a Gentleman's Family Residence. Voluntary Boarders can be received.

The Sanitary arrangements and Ventilation are modern in design and perfect in construction, and are certified to be so by the Sanitary Authority.

The Medical Superintendent lives in the House, and is assisted in his duties by two Assistant Physicians, and an experienced Lady Superintendent.

Every exertion is made to promote health and comfort, both by moderate bodily employment and by variety in amusements, such as reading, music, drawing, excursions, golf, billiards, croquet, lawn tennis, theatricals, re-unions, etc. A library is provided, containing some 2,000 works of varied character, suited to the condition of the patients; also periodicals, magazines, and newspapers. Motor exercise is provided.

Due provision is made for the spiritual welfare and consolation of the Patients, and Divine Service is held every Sunday in the Institution.

The Pleasure Grounds, which are very spacious, have been laid out in the most tasteful manner especially for the recreation of the Patients; and contain conservatories, lawns for croquet and tennis, a private golf course, and other out-door games; also a theatre, two billiard rooms, and workshop for the in-door occupation of Patients. The House is heated throughout by means of hot-water apparatus and open fireplaces.

Buxton is directly accessible by the Midland and the L. & N.W. Railways. It is situated on the mountain limestone formation, 1000 feet above sea level. Being a watering-place, it affords exceptional advantages and varied recreations to convalescent Patients.

Particulars of Terms and Forms of Admission on application to THE MEDICAL SUPERINTENDENT.

The Lawn, Lincoln.

A REGISTERED HOSPITAL for MENTAL DISEASES,
situated in the City of Lincoln, near to the Cathedral.

FOR TERMS, APPLY TO

DR. RUSSELL, Resident Medical Superintendent.**BOOTHAM PARK, YORK.**

A REGISTERED MENTAL HOSPITAL
for the Treatment and Care of Nervous and
Mental Invalids of the Upper & Middle Classes

For Particulars apply to the Medical Superintendent—

GEORGE RUTHERFORD JEFFREY, M.D. Glasg., F.R.C.P.E., F.R.S.E.**ST. MARY'S HOUSE
WHITCHURCH, SALOP.**

DR. and Mrs. GWYNN receive into their house a limited number of Ladies suffering from the milder forms of MENTAL DISEASE. Each patient has a separate bedroom and sitting room *en suite*, and a special attendant.

TERMS ON APPLICATION.

ESTABLISHED 1814.

NORTHUMBERLAND HOUSE,

GREEN LANES, FINSBURY PARK, N.

Telephone No.: 888 North. Telegrams: "Subsidiary," London.

An INSTITUTION for the Care and Treatment of Ladies & Gentlemen suffering from NERVOUS and MENTAL AFFECTIONS.

Four miles from Charing Cross; nearest Station, Finsbury Park (G.N. and N. London Railways); Tubes to City and West End. Electric Cars from Finsbury Park Station run every few minutes past the gates.

Six acres of ground, highly situated, facing Finsbury Park.

Private Villas, in suites of rooms.

Voluntary Boarders received without certificates.

SEASIDE BRANCH AT WORTHING.

For Terms and other particulars apply to RESIDENT PHYSICIAN.

HOLLOWAY SANATORIUM VIRGINIA WATER.

A Registered Hospital for the CURE and CARE of the INSANE and of NERVOUS INVALIDS of the MIDDLE and UPPER CLASSES.

THIS Institution is situated in a beautiful and healthy locality, within easy reach of London. It is fitted with every comfort. Patients can have Private Rooms and Special Attendants, as well as the use of General Sitting Rooms, at moderate rates of payment. Voluntary Boarders not under Certificates can be admitted. There is a Branch Establishment at Canford Cliffs, Bournemouth, where Patients and Boarders can be sent for a change, and provided with all the comforts of a well-appointed home.

*For Terms, apply to the RESIDENT MEDICAL SUPERINTENDENT,
St. Ann's Heath, Virginia Water, SURREY.*

THE RETREAT, YORK.

ESTABLISHED 1792.

A Registered Hospital for the Treatment of Mental Diseases.

Under the management of a Committee of Members of the Society of Friends. Situated about two miles from York Station. The Patients are derived from the Upper and Middle Classes, and none are paupers or rate-aided. Terms from 63/- weekly.

Voluntary Boarders are received on their own application.

For further particulars see the Annual Report, which will be sent on application to Dr. BEDFORD PIERCE, the Medical Superintendent. Nat. Telephone: 112 York.

THROXENBY HALL, Near SCARBOROUGH.

A Branch House connected with The Retreat, York, situated near the Raincliffe Woods, about two miles from Scarborough, for the reception of Convalescent Patients, also for the treatment of persons suffering from incipient or mild forms of Mental Disorder who cannot be certified as of unsound mind, and who wish voluntarily to place themselves under skilled treatment.—For further particulars apply to the MATRON, THROXENBY HALL, SCARBOROUGH; or to Dr. BEDFORD PIERCE, at THE RETREAT, YORK. Nat. Telephone: 282 Scarborough.

RETREAT TRAINED NURSES DEPARTMENT.

Staffed by Nurses who have been trained for four years in the Retreat, and conducted upon a profit-sharing basis. MENTAL and NERVOUS CASES only undertaken.

TRAINED MALE NURSES, £2 10s. to £3 3s. weekly. Apply MATRON, Retreat, York
TRAINED FEMALE NURSES, £2 2s. to £3 3s. weekly. Nat. Tel. 112.

Incorporated by



Royal Charter.

JAMES MURRAY'S ROYAL ASYLUM, PERTH.

Chairman—The Rt. Hon. The Earl of Mansfield.

THIS MENTAL HOSPITAL, FOR PRIVATE PATIENTS ONLY, is beautifully situated in the immediate vicinity of Perth, in the midst of extensive Pleasure Grounds, which are surrounded by the fields of the Home Farm.

The Main Building has been entirely re-organized and enlarged by the addition of *two wings*, for the reception of acute cases, so as to render it an efficient *Hospital* as well as a comfortable *Home*.

The Mansion-House of PITCULLEN, which is quite separate from the Asylum, and THE EAST AND WEST VILLAS, afford the necessary variety of accommodation for modern treatment. SEVEN GABLES, ELIE, the seaside house, is arranged for the reception of those suffering from mild mental disturbance, and for convalescents.

Physician Superintendent: R. DODS BROWN, M.D., F.R.C.P.E.

Telephone No.:

Consulting Physician: A. R. URQUHART, M.D., F.R.C.P.E., LL.D.

104 Perth.

ASHWOOD HOUSE, KINGSWINFORD, STAFFORDSHIRE.

An old-established and modernized Institution for the Medical Treatment of Ladies and Gentlemen Mentally Afflicted.

THE House, pleasantly situated, stands in picturesque grounds of forty acres in extent, with a surrounding country noted for the beauty of its walks and drives. The climate is genial and bracing. Occupation, indoor and outdoor amusements, and carriage and other exercise amply provided.

TERMS vary according to requirements as to accommodation, special attendance, etc.

TELEPHONE: 19, KINGSWINFORD.

Railway Stations: Stourbridge Junction (G.W.R.), $3\frac{1}{2}$ miles; Dudley (L. & N.W.R.), 4 miles; Wolverhampton (G.W.R. or L. & N.W.R.), 7 miles.

FOR FURTHER PARTICULARS APPLY TO THE MEDICAL SUPERINTENDENT.

NORTHWOODS HOUSE, WINTERBOURNE, near BRISTOL.

A Sanatorium for Ladies and Gentlemen suffering from Nervous and Mental Disorders.

SITUATED in a large Park, 300 feet above sea level, in a healthy and picturesque locality, easily accessible from London, Bristol, and Cardiff by Winterbourne Station; or from Fishponds, Yate, or Patchway Stations.

Voluntary Boarders received without Certificates.

For further information, see London Medical Directory, p. 2040, and for Terms, etc., apply to Dr. J. D. THOMAS, Resident Medical Proprietor, Northwoods House.

Dr THOMAS attends at 64, PARK STREET, BRISTOL,
on Mondays and Thursdays, from 12 to 1.30 o'clock.

TELEPHONE: No. 18 WINTERBOURNE.

BARNWOOD HOUSE, GLOUCESTER.

A REGISTERED HOSPITAL for PRIVATE PATIENTS
Only, of the UPPER and MIDDLE CLASSES.

ARRANGED and furnished with all the most approved appliances for the treatment, comfort, and amusement of the Inmates. Within two miles of the Railway Station, and easily accessible by Rail from London and all parts of the kingdom. It is beautifully situated at the foot of the Cotswold Hills, and stands in its own grounds of 250 acres.

For Terms, etc., apply to JAS. GREIG SOUTAR, M.B., C.M.,
TELEPHONE No. 307. *Resident Superintendent.*

PLYMPTON HOUSE, PLYMPTON, SOUTH DEVON ESTABLISHED 1834.

PLYMPTON HOUSE is licensed for the accommodation of both sexes, and is well adapted by its position and appointments for the **Medical Treatment and Care of Patients of the Upper and Middle Classes, suffering from MENTAL DISEASE.**

The proprietors, Dr. ALFRED TURNER and Dr. J. C. NIXON, have had very large experience of Mental cases, both in public and private institutions, and everything that can be done to ameliorate the condition of the chronic, and promote the cure of the acute cases—placed under their charge—is guaranteed.

TERMS ON APPLICATION. *Letters and Telegrams:*
Telephone: No. 2 PLYMPTON. **DR. TURNER, PLYMPTON.**

OTTO HOUSE, 47, North End Road, WEST KENSINGTON, W..

Telephone: No. 1004 Hammersmith.

A HOME FOR THE CARE AND TREATMENT OF LADIES
MENTALLY AFFLICTED.

Apply to MISS BRODIE (Resident Lady Superintendent), or to
A. H. SUTHERLAND (Licensed Propr.), 2a Marloes Road, KENSINGTON, W.

“NORMANSFIELD.”

A PRIVATE ESTABLISHMENT for the care and training of the
MENTALLY DEFICIENT.

Patients of either sex, including quite young children, received.
Separate houses for the slighter grades of defect.

For particulars apply to the Resident Physician and Proprietor, HAMPTON WICK.

THE WARNEFORD, HEADINGTON HILL, OXFORD.

A Registered Hospital for the Care and Treatment of both Sexes of the Upper and Middle Classes, when suffering from Nervous and Mental Disorders.

President—THE RIGHT HON. THE EARL OF JERSEY.

Chairman of the Committee—

THE REV. WILLIAM ARCHIBALD SPOONER, D.D., Warden of New College, Oxford.

Vice-Chairman—SURGEON-GENERAL SIR A. FREDERICK BRADSHAW, M.A., K.C.B.

The Regular Charge for Patients is £2 2s. a week, but the Committee have power to alter the charges at their discretion, as the circumstances of cases require.

The building is arranged, so far as is compatible with the requirements of a Mental Hospital, in the manner of an ordinary private residence.

The Hospital possesses an Endowment Fund, arising from numerous grants of the late Dr. SAMUEL WILSON WARNEFORD and others. When a reduction of the ordinary charge is asked, a special statement of the circumstances of the Patient must accompany the application for Admission.

For further particulars, apply to the Medical Superintendent, ALEX. W. NEILL, M.D.

THE GRANGE, Near ROTHERHAM, A SANATORIUM OF THE HIGHEST CLASS FOR THE CARE & CURE OF MENTAL INVALIDS (LADIES).

Consulting Physician: CROCHLEY CLAPHAM, M.D., F.R.C.P.E.

Resident Physician: G. E. MOULD, M.R.C.S. Eng., L.R.C.P. Lond.

Physician for Mental Diseases to the Sheffield Royal Hospital.

THE House is a spacious Family Mansion, with extensive pleasure grounds, including good Croquet and Tennis Grounds, and an immense Park, containing Private Drives and Walks of several miles in extent. It is situated in the heart of the famous Robin Hood Country (5 miles from Sheffield, 4 from Rotherham) and is surrounded by beautiful scenery, and an atmosphere free from smoke and impurity. Situation dry and healthy. The arrangements are of a domestic character. The Proprietors welcome visits from the usual Medical Attendant of the Patient during her residence. Under the New Act Voluntary Patients can be received, without Certificates, on own personal application. The Rev. R. T. C. SLADE, Mus. Bac., Vicar of Thorpe-Hesley, acts as Chaplain, and conducts regular Services.

The Resident Physician may be seen at the Grange; or at Leavygreave House, Hounslow Road, Sheffield, by appointment. (Nat. Tel. No. 34, Rotherham.)

GRANGE LANE STATION (M. S. & L. Railway) is within a quarter of a mile of The Grange, and may be reached via Sheffield or Barnsley direct; or via Rotherham, changing at Tinsley.

FOR TERMS, FORMS, &c., APPLY TO THE RESIDENT PHYSICIAN.

CLARENCE LODGE, CLARENCE ROAD, CLAPHAM PARK.

A LIMITED number of LADIES suffering from MENTAL and NERVOUS DISORDERS are received for treatment under a Specialist. The House stands in large grounds.

For further Particulars see Illustrated Prospectus from the Proprietress,
Telephone: 494 Brixton. MRS. THWAITES.

CORPORATION MENTAL HOSPITAL PORTSMOUTH.

ACCOMMODATION is provided for LADIES and GENTLEMEN in TWO DETACHED VILLAS, very pleasantly situated, at a charge from £1 11s. 6d. upwards, including all necessities except clothing.

APPLY . . . MEDICAL SUPERINTENDENT.

STOKE PARK COLONY



For Mentally
Defective Children,
STAPLETON,
BRISTOL.

Apply to Secretary—**The Incorporation of National Institutions
for Persons requiring Care and Control,
14 Howick Place, Westminster, S.W.**

Telephone: 3045, Victoria.

Telegrams: "Burdensome, London."

THE ROYAL ALBERT INSTITUTION LANCASTER.

The ROYAL ALBERT INSTITUTION is a Home for the Care, Education and Training of the IMPROVABLE FEEBLE-MINDED, with accommodation for 750 cases.

Terms: 1. FREE PATIENTS, between the ages of Six and Fifteen, whose friends cannot meet the lowest payment of 25 Guineas per annum.

2. PAYING PATIENTS admitted by the Central Committee without Election and at any time. The charges vary from 25 to 200 Guineas per annum.

BRUNTON HOUSE (For Private Pupils).

BRUNTON HOUSE combines the comforts of a Private Home with all the advantages of a large Public Institution under responsible management. It possesses extensive gardens and grounds which include tennis and croquet lawns. Individual attention is given to the pupils by an experienced Staff, under a Resident Physician and Lady Matron. **SAMUEL KEIR, General Secretary.**

TUE BROOK VILLA, LIVERPOOL, E.

PRIVATE ASYLUM for the Care and treatment of Ladies and Gentlemen
MENTALLY AFFLICTED. Voluntary Boarders also received without
certificates.

For terms apply to: **J. J. TISDALL, L.R.C.P. & S. or** *Resident Medical*
F. E. INGALL, F.R.C.S. Eng. *Superintendents.*

MERRISON, DORCHESTER ASYLUM.

This Home for Private Patients is delightfully situated, with all modern conveniences for the treatment of the Insane. Terms on application to the MEDICAL SUPERINTENDENT, Herrison, Dorchester.

Telegrams: "HERRISON, CHARMINSTER."

The SILVER BIRCHES, Church Street, EPSOM.

This Home has been established over 60 years for the Care and Treatment of Ladies suffering from Mental Ailments.

TERMS, Etc., on application to—

MISS M. O. DANIEL, *Res. Licensee*, or to Dr. E. C. DANIEL, *Co-Licensee*.

Telephone: 346 P.O. Epsom.

PRIVATE ASYLUMS. CO. DUBLIN.

HAMPSTEAD, Glasnevin, for Gentlemen | HIGHFIELD, Drumcondra, for Ladies.

For the Cure and Care of Patients of the Upper Class suffering from
Mental and Nervous Diseases and the Abuse of Drugs.

Telephone No. 1032.

Telegrams: "Eustace," Glasnevin.

**These Hospitals are built on the Villa System, and there are also
Cottages on the demesne (154 acres), which is 150 ft. above the sea level
and commands an extensive view of the Dublin Mountains and Bay.**

Voluntary Patients admitted without Medical Certificates.

For further information apply for illustrated prospectus, etc., to the Resident Medical
Superintendents: DR. HENRY MARCUS EUSTACE, Highfield, Drumcondra, or DR. WILLIAM
NIELSON EUSTACE, Hampstead, Glasnevin; or at the Office, 41, Crafton Street, Dublin.
Telephone 198. On Mondays, Wednesdays and Fridays, at 2.30 p.m.

ESTABLISHED 1824.

The Retreat Private Asylum, NEAR ARMAGH.

For the CURE and TREATMENT of Ladies and Gentlemen of the Upper
and Middle Classes suffering from

MENTAL AND NERVOUS DISEASES.

Voluntary Boarders and Inebriates admitted without Medical Certificates.

This Retreat is beautifully situated in picturesque grounds of 150 acres, and Patients enjoy the
greatest possible liberty. There is a large percentage of Recoveries on recent admissions.

For particulars apply to the Resident Medical Superintendent,
Dr. J. GOWER ALLEN, J.P.

FARNHAM HOUSE FOR GENTLEMEN || MARYVILLE FOR LADIES FINGLAS, NEAR DUBLIN.

Private Hospitals for Patients of the Upper Classes suffering from NERVOUS and MENTAL DISEASES, ALCOHOLISM, ETC. Telephone—Dublin 1470
Telegrams—"FINGLAS."

THESE Establishments, which are healthily situated in pretty grounds, upwards of 59 acres in
extent, provide modern medical curative and palliative treatment on moderate terms.
Voluntary Boarders admitted without Certificates. Large Staff maintained. Up-to-date
sanitation.

A SEPARATE WING has been set apart for the Treatment of ALCOHOLISM
and DRUG HABITS, with their own reception rooms and grounds.

Prospectus and Terms on application to—

H. P. D'ARCY BENSON, M.D., M.R.C.P., F.R.C.S. (Edin.), Resident Medical Supt.,
Farnham House, FINGLAS, DUBLIN.

DERBY MENTAL HOSPITAL.

ALBANY HOUSE, a Detached Block for FEMALE PRIVATE PATIENTS.

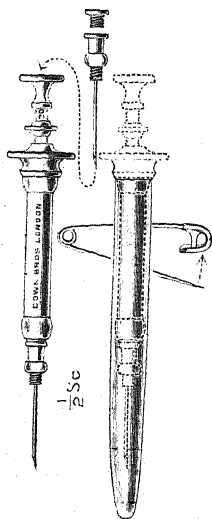
TERMS: 1½ GUINEAS PER WEEK, which includes everything except
clothing. This Villa is distinct from the main building, and has separate
recreation grounds.

For further particulars, apply to the Medical Superintendent,

Dr. S. R. MACPHAIL, Rowditch, DERBY.

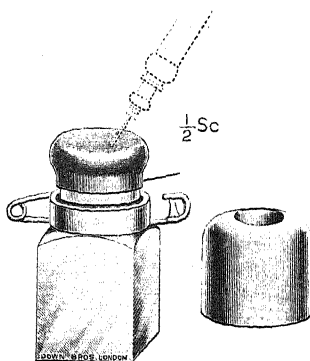
DOWN BROS.' SPECIALITIES

A New Hypodermic Syringe



Designed by Deputy Surgeon-General Wildey, R.N.,
for giving rapid Hypodermic Injections in "Action."

As supplied
to
His Majesty's
Navy.



DESCRIPTION.

The Syringe is fitted in a sheath which is attached to the coat by means of a safety pin—the sheath keeps it free from dust and dirt; it can be rapidly removed from the sheath and replaced. It is used in conjunction with a solution bottle with rubber cap; the syringe can be rapidly charged by passing the needle through the rubber cap.

Deputy Surgeon-General Wildey, R.N., writes:—"It has given very great satisfaction in Naval Actions, and many Army Surgeons who have seen it used by Naval Medical Officers ashore have been much impressed with its handiness."

Captain E. H. Griffin, R.A.M.C., "B.E.F., France," writes:—"The Syringe gives me the greatest satisfaction in the Field, and I am only sorry I had not got hold of it earlier in the Campaign. I have recommended it to many Regimental Medical Officers."

Prices:—Syringe, with sheath, 8/3; Bottle, with cap, 3/3.

Manufactured only by

GRANDS PRIX:
PARIS 1900, BRUSSELS 1910, BUENOS AIRES 1910.



GOLD MEDAL
ALLAHABAD 1914.

DOWN BROS. LTD.

Surgical Instrument Makers,
21 & 23 St. Thomas's St., London, S.E.
(OPPOSITE GUY'S HOSPITAL).

Telegrams:
"DOWN,
LONDON."

Telephones:
Hop. 4400 (4 lines)

DOWN BROS.' SPECIALITIES

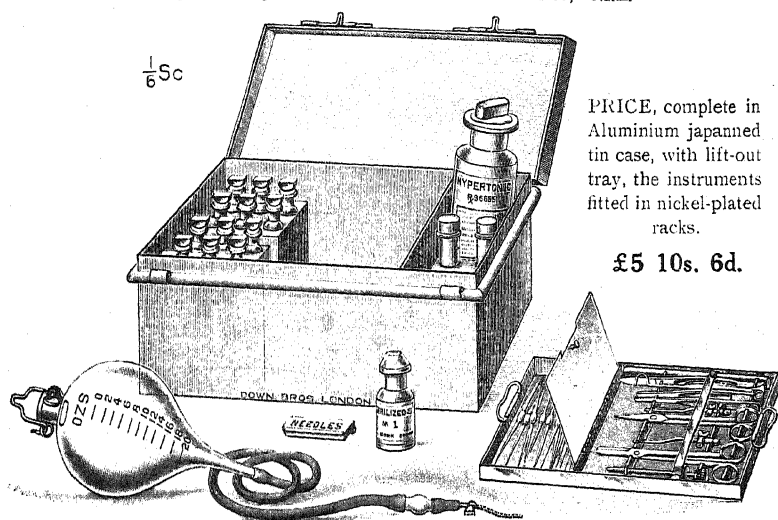
COMPLETE PORTABLE APPARATUS

For Injecting Hypertonic Saline Solution in Cholera Collapse and Infantile Diarrhoea;

ALSO USEFUL FOR

POST-OPERATIVE INFUSIONS, Etc.

Suggested by LT.-COL. LEONARD ROGERS, C.I.E.



PRICE, complete in Aluminium japanned tin case, with lift-out tray, the instruments fitted in nickel-plated racks.

£5 10s. 6d.

DESCRIPTION.

ROGERS' APPARATUS, consisting of a sterilizable glass bulb to hold the solution, of a capacity of a little over 1 pint, graduated every 2 ounces from 0 to 20, a length of about 4 feet of rubber tubing, to connect it with a cannula, 2 silver cannulae of different sizes with regulating stop-cocks, tapered so as to enter the vein, for intra-venous infusion, and a sharp cannula with flange fitted with a silette, for intra-peritoneal infusion, metal collar and loop for suspending reservoir, as suggested by Lieut.-Col. E. Newman, I.M.S., scalpel and aneurysm needle with solid forged and nickel-plated handles, rat-tooth forceps, dissecting forceps, artery forceps and scissors, nickel-plated, sterilized silk in alcohol, needles in metal box, two tubes, tablets for making normal saline solution and bottle of 100 hypertonic tablets, with directions for making solutions, thermometer in metal case and set of 15 bottles marked 104, 106, etc., to 1072 to hold solutions for testing specific gravity of the blood and separate metal partition filled with blood tubes.

Manufactured only by

GRANDS PRIX :
PARIS 1900, BRUSSELS 1910, BUENOS AIRES 1910.

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Surgical Instrument Makers,
21 & 23 St. Thomas's St., London, S.E.
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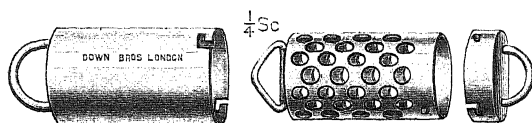
DOWN BROS.' SPECIALITIES

A NEW

GLOVE STERILIZER.

(REGISTERED),

Suggested by Mr. D. M. GREIG, F.R.C.S., etc., Surgeon,
Dundee Royal Infirmary.



A glove sterilizer uncomplicated by hinges, or lids, of a pattern small enough to be portable for private work, or made large enough to be useful in the theatre of a nursing home or hospital.

The cartridge can be sterilized anywhere by tying a string to the handle of the inner cylinder and dropping it into a kettle of boiling water.

Made in two sizes.

Small, for 1 pair Gloves	-	-	-	14/6
Large, for 4 pairs Gloves	-	-	-	22/6

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GOLD MEDAL
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21 & 23 St. Thomas's St., London, S.E.
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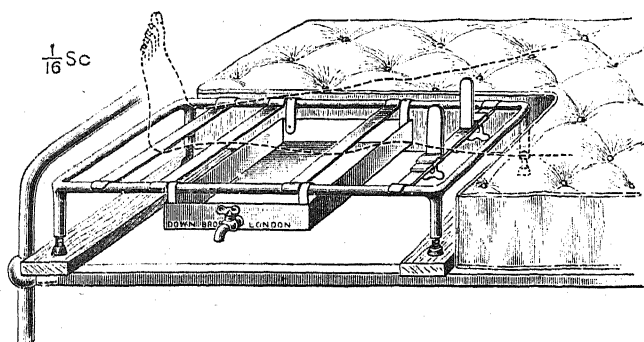
Telegrams:
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DOWN BROS.' SPECIALITIES

A STAGING TO FACILITATE DRAINAGE AND CONTINUOUS IRRIGATION.

By E. H. WILLOCK, M.R.C.S., L.R.C.P., Assistant Surgeon,
Croydon General Hospital:



The advantages claimed for the staging are :—

1. Free continued irrigation can be carried on in any part of the body.
2. An entire avoidance of heavy dressings and "pus poultices."
3. Free drainage from dependent parts.
4. Free circulation of air about the wound.
5. Easy dressing.
6. By utilizing it in the transverse position it may be of use in cases of incontinence of urine and fæces.

The apparatus is in use at the Royal Albert Hospital, Woolwich, and Major Spencer, F.R.C.S., R.A.M.C., reports "that it fulfils its purpose admirably, and enables continuous irrigation of a wound in any part of the body to be carried out efficiently and easily without discomfort to the patient or disturbance when dressings are changed, and without risk of leakage into the bed."

Manufactured only by

GRANDS PRIX :
PARIS 1900, BRUSSELS 1910, BUENOS AIRES 1910



DOWN BROS. LTD.

Surgical Instrument Makers,
21 & 23 St. Thomas's St., London, S.E.
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Telegrams :
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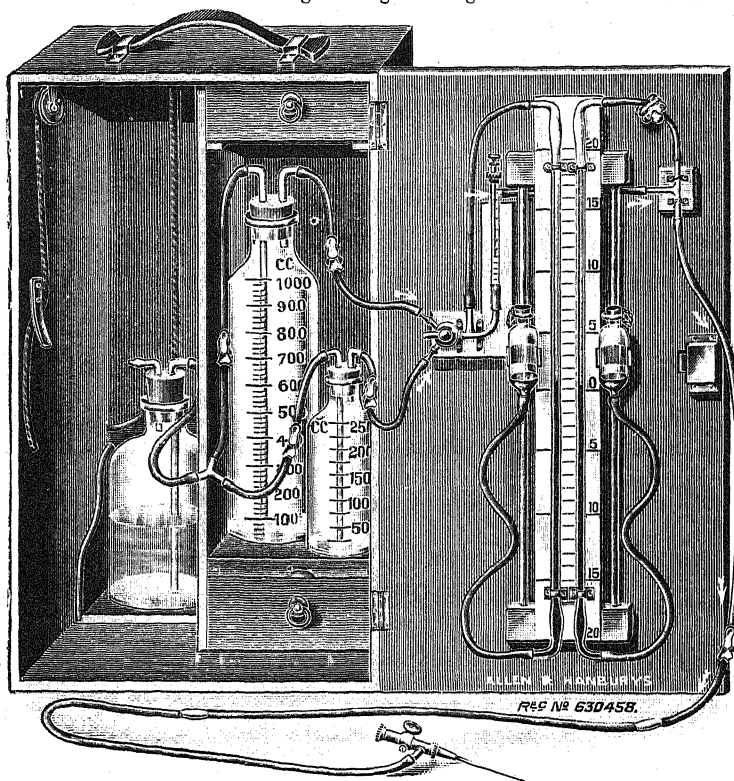
ALLEN & HANBURY'S Ltd. LONDON

Manufacturers of Surgical Instruments & Aseptic Hospital Furniture.

Apparatus for the Production of Artificial Pneumo-Thorax

INVENTED BY Dr. W. PARRY MORGAN, Therapeutic
Inoculation Department, St. Mary's Hospital, London.

A. & H.'s Regd. Designs. Regd. Nos. 630458 and 630325.



Full
particulars
on
application.

ALLEN & HANBURY'S Ltd.,

48, WIGMORE STREET, LONDON, W.

INSTRUMENT FACTORY - BETHNAL GREEN, E.

Telephone: 6476 Mayfair (4 lines).

Telegrams: "Orthopedic, Wesdo, London."

ALLEN & HANBURY'S Ltd. LONDON

Manufacturers of Surgical Instruments & Aseptic Hospital Furniture.

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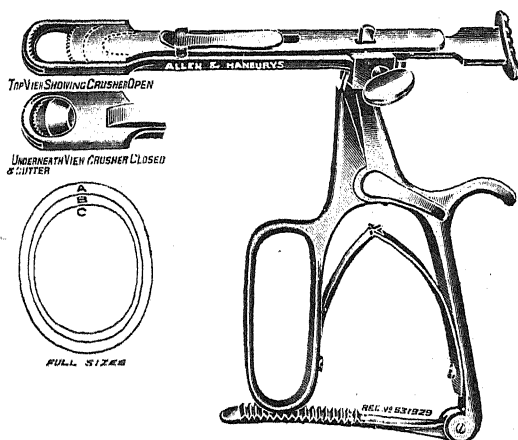
New TONSILLECTOME

with combined Crushing and Cutting
action, for the complete enucleation
of Tonsils.

INVENTED BY - Dr. GEORGE ELPHICK.

The use of this Instrument ensures practically a Bloodless
Operation.

See THE LANCET, July 18th, 1914.



ELPHICK'S TONSILLECTOME

A. & H.'s Registered Design.

Full
particulars
on
application.

ALLEN & HANBURY'S Ltd.,

48, WIGMORE STREET, LONDON, W.

INSTRUMENT FACTORY - BETHNAL GREEN, E.

Telephone: 6476 Mayfair (4 lines).

Telegrams: "Orthopedic, Wesdo, London."

THE HOLBORN Universal Portable Splint.

(Patent.)

Designed by F. THOMPSON, M.R.C.S., L.R.C.P., London,
Surgeon, Hampton Hospital; Surgeon, Metropolitan Police.

Highest Award



London, 1913.

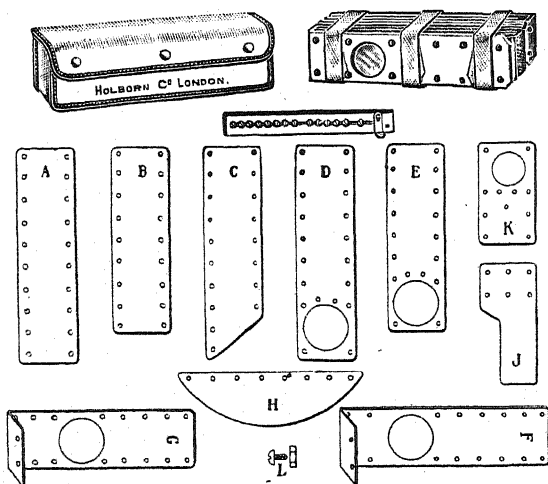


FIG. 1.

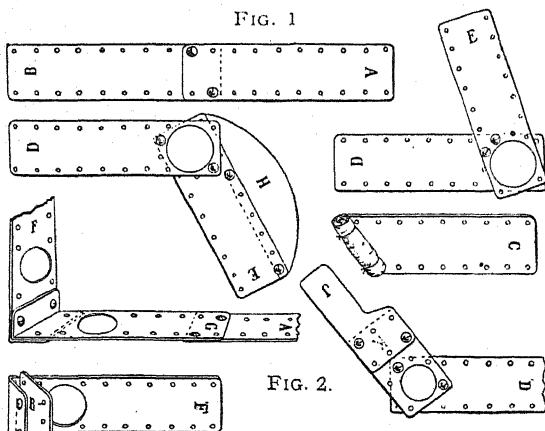


FIG. 2.

FIGURE 1.—Shows the ten pieces comprising the set, and the holder for bolts and nuts.
FIGURE 2.—A, B, straight combinations; E, D, angular combinations which can be set at any angle; D, E, H, pistol splint; C, Carr's splint; A, F, G, and F, B, leg combinations with foot piece; D, J, K, finger splint; Various other combinations can be made.

Price, Complete, with Padding, Buckles and Triangular Bandage	...	21/-
Khaki Case, extra	...	2/-

The Holborn Surgical Instrument Co. Ltd.
LONDON.

CONTRACTORS TO THE WAR OFFICE.

MAYER & MELTZER

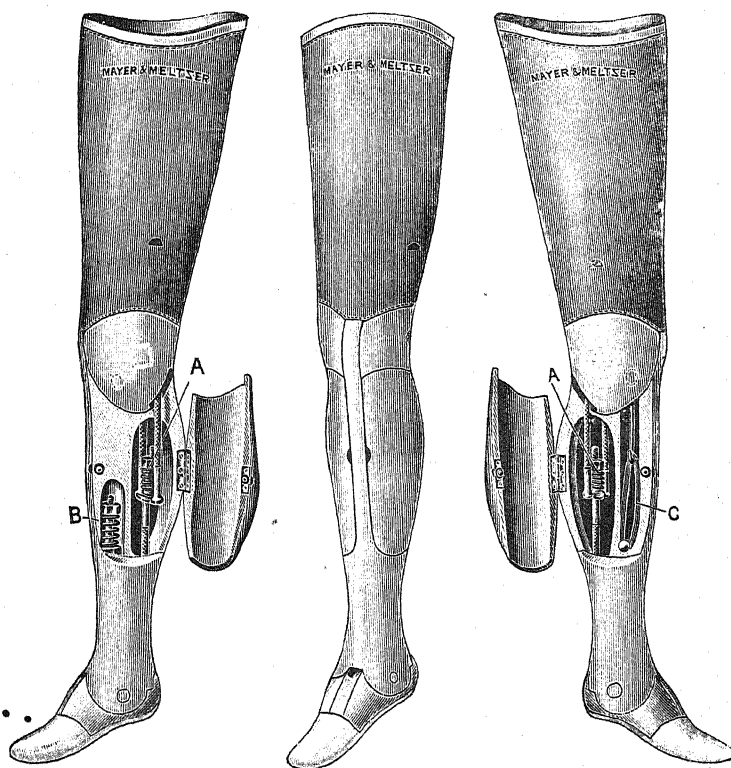
1863

ESTABLISHED over FIFTY Years

1916

Manufacturers
of**Surgical Instruments**

OF THE HIGHEST QUALITY.

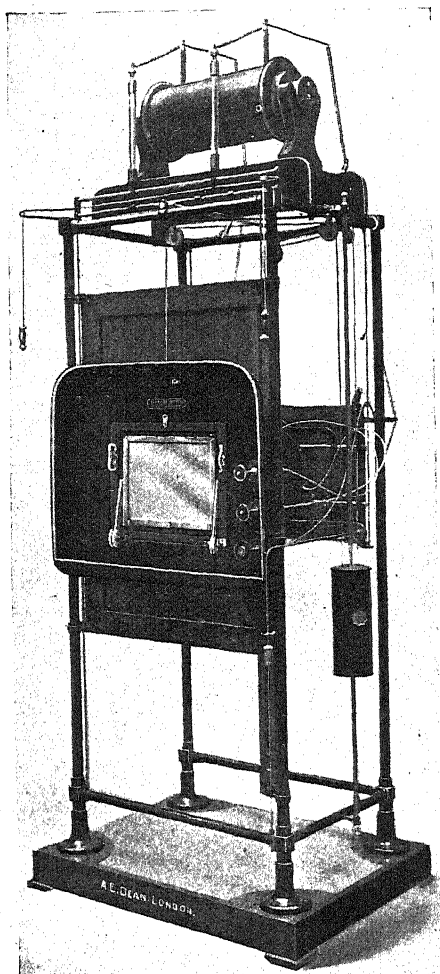
**"Emandem" Artificial Leg (BONES' PATENT).**

MAYER & MELTZER received the **ONLY MEDAL** awarded to a **BRITISH FIRM** for improvements in **ARTIFICIAL LEGS**, at the International Exhibition of Artificial Legs, held at Roehampton House, in connection with Queen Mary's Convalescent Auxillary Hospitals.

*Full Particulars on application—***71, Great Portland Street, LONDON, W.**

THE DIASCOPE

MODEL 1913.



For
X-Ray Examination
of Throat, Lungs, and
Stomach of Children
and Adults.

Localisation
and Examination of
Suspected Areas in
Pulmonary
Tuberculosis.

More than One Hundred of
these Diascopes have been
supplied to County Councils,
Education Committees,
Local Authorities and Gen-
eral Hospitals.

An Auxiliary of Dean's
Ringworm Apparatus work-
ing in conjunction and from
the same source of supply.

**ENTIRELY
BRITISH WORK.**

Apply for explanatory pamphlets, etc., to

ALFRED E. DEAN

LEIGH PLACE, BROOKE STREET,
MOLBORN, LONDON.

THE MEDICAL SUPPLY ASSOCIATION,

Telegraphic Address: 167 to 185, GRAY'S INN ROAD, LONDON, ENGLAND.
"Grevillite, London."

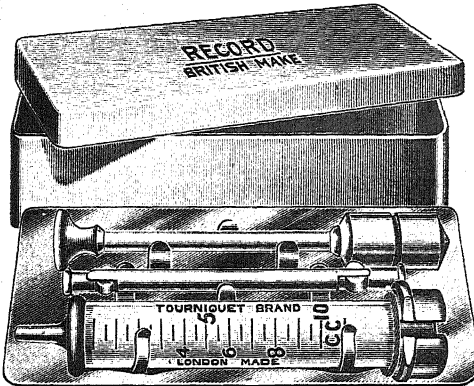
ALSO AT

Edinburgh, Glasgow, Dublin, Sheffield, Cardiff, and Belfast.

Telephone: Holborn 2989
Central 2960

RECORD SYRINGES 'TOURNIQUET BRAND'

ENTIRELY BRITISH MANUFACTURE.



Each Piston being separately ground in enables us to guarantee the accurate fitting of every syringe.

	each s. d.
20 min. or 1 cc.	10 6
40 min. or 2 cc.	13 6
5 cc.	16 6
10 cc.	23 6
20 cc.	26 6

Repairs to 'Tourniquet Brand' Record Syringes.

New barrel and piston fitted and returned in a few days.

	each s. d.
1 cc. or 20 min.	5 6
20 cc. or 40 min.	6 3
5 cc.	8 0
10 cc.	10 0
10 cc.	11 6

**TWO
PIECE**



**ALL GLASS
SYRINGES**

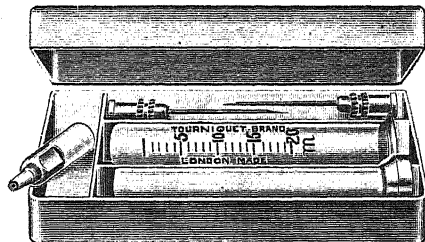
Complete with two needles in metal case.

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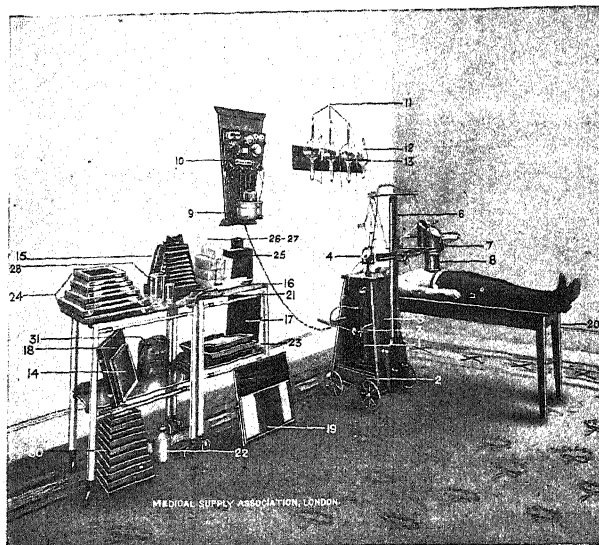
	each s. d.
20 min. in card case	9 6
5 cc. in metal case	18 6
10 cc. in metal case	22 6

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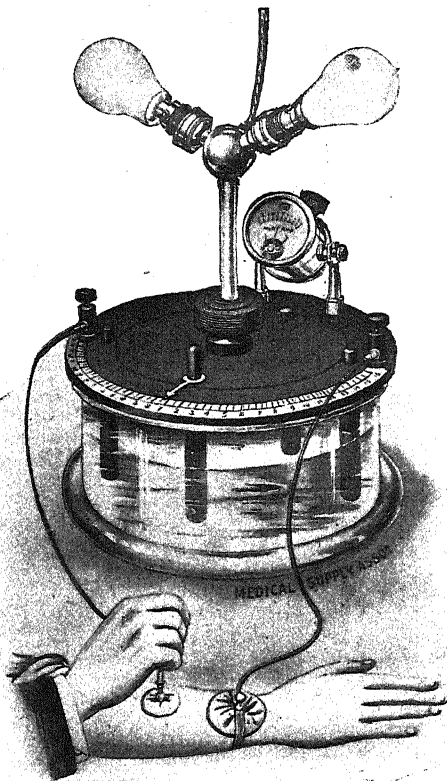
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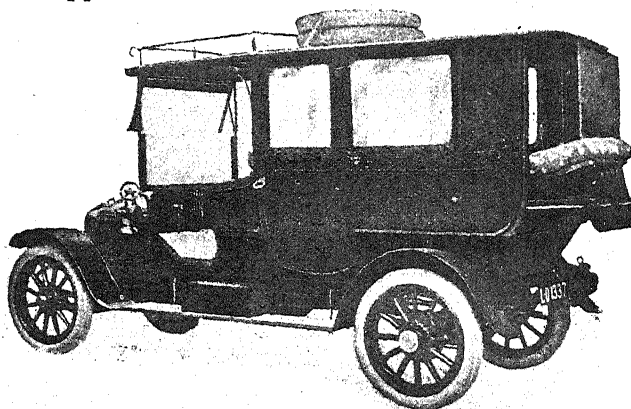
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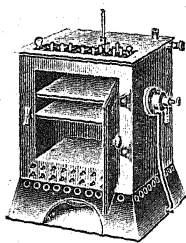
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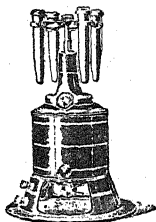
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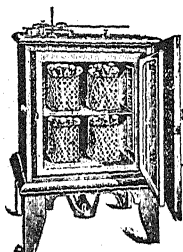
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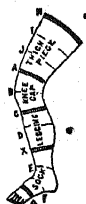
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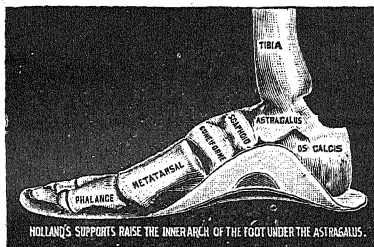
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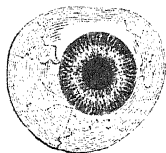
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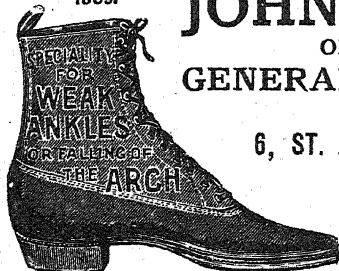
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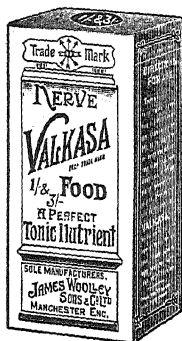


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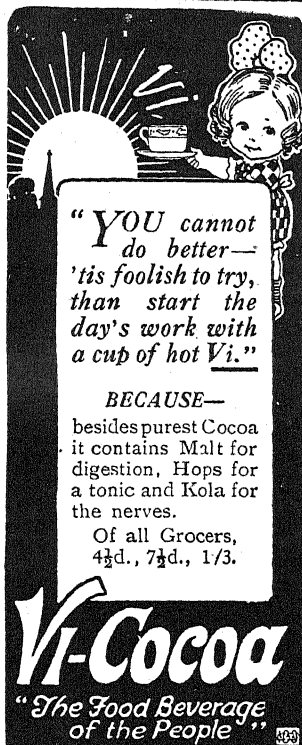
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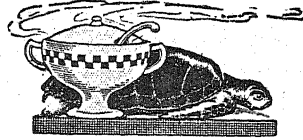
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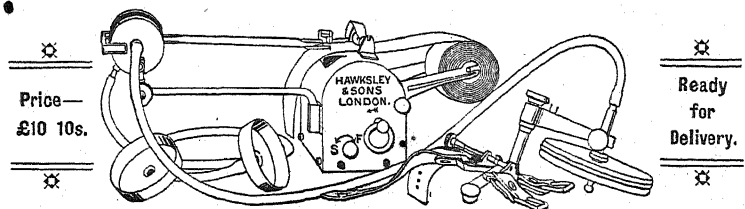
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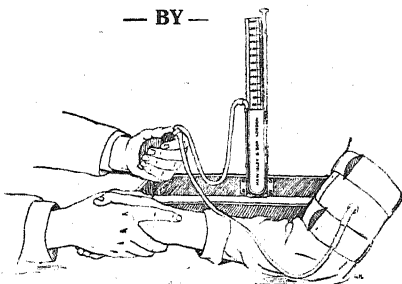
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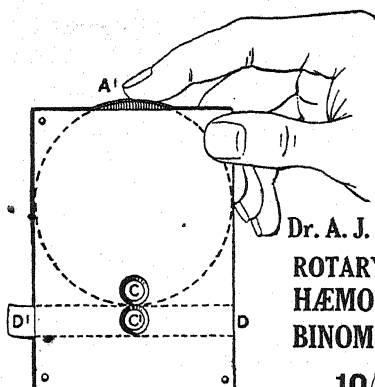
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